PREFACE

This Report of the Comptroller and Auditor General of India for the year ended March 2009 containing the results of the Performance Audit of the 'Activities of National Remote Sensing Centre', a unit under Department of Space, has been prepared for submission to the President of India under Article 151 of the Constitution.

The Performance Audit was conducted between June 2008 to May 2009 through test check of records relating to planning and launch of remote sensing satellites, various project files, budget files and other related records of the National Remote Sensing Centre.

The results of our audit, recommendations and response of the management to our recommendations are contained in this Report.

Executive Summary

Why did we decide to examine this issue?

National Remote Sensing Centre (NRSC) is one of the units of Department of Space (DOS). NRSC is the nodal agency for operational remote sensing activities and the sole authority to acquire, process and disseminate the remotely sensed satellite data products within India. NRSC mainly acquires remote sensing data from six operational Indian Remote Sensing (IRS) satellites and a few other foreign satellites.

We selected NRSC for a Performance Audit as remote sensing formed an important part of nation's space programme which was helping in the efficient management of nation's resources in the fields of agriculture, water resources, urban development, disaster management, etc. Besides, there was substantial investment of ₹ 2206 crore towards cost of seven satellites and other related programmes.

What did our performance audit reveal?

During the course of the performance audit, we examined the effectiveness in the utilisation of remote sensing satellites in operation, its data acquisition, processing of data and maximisation of revenue through sale of data products. The primary objective of our performance audit was to examine whether satellite and airborne remote sensing was effectively conducted and projects undertaken were fruitful. We also examined that whether adequate training was imparted to ensure effective usage of data products and an efficient financial management system was in place to aid NRSC in carrying out its mandated activities. Our audit examination highlighted the following critical issues:

Utilisation of remote sensing satellites, data acquisition and processing	*Performance Audit on the activities of NRSC revealed that performance of three out of the seven remote sensing satellites was below their maximum capacity in terms of the number of remote sensing satellite data captured by them. The revenue realised from seven satellites in operation was not up to the desired level. The satellites were planned without adequate thematic data need assessment. Idling of acquired IRS data was high due to non-adopting of appropriate marketing strategy. While there was a need to review and augment data acquisition capacity of NRSC after conducting a realistic data need assessment, there were also delays in data processing impacting the delivery of available data products.*
Sale of data products	*The efforts of NRSC were not adequate in customising the data according to the needs of private users and also in exploring the possibility of widening the customer base. The sale of data products to private users did not improve as recommended by Standing Committee of Parliament of DOS. Further, there was scope for enhancing the rates of IRS data products in line with international rates.*

Aerial Remote Sensing	*NRSC was the sole civilian provider of aerial remote sensing services in the country. It had two beach aircrafts in operation to attend to various aerial projects. These aerial projects were meant for remote sensing in specific areas at required times, which was not possible from the remote sensing satellites. We observed that aircrafts performing the task of aerial remote sensing could not be put to use to their maximum capacity mainly due to non-availability of pilots and technical snags in the aircrafts. As a result, one third of aerial projects test checked were found to have been delayed.*
Remote Sensing Application Projects	*NRSC was responsible for providing services to Government users by undertaking remote sensing application projects aimed at achieving vital social objectives like food security, conversion of wastelands into usable land, water security through drinking water missions, environment security through disaster management support programmes, etc. NRSC also undertook operational projects directly from various users for delivering processed remote sensing data and maps.* *Performance Audit of these projects revealed that NRSC did not adequately coordinate with various agencies for effective implementation of these projects. Further, there were instances of deficiencies in planning and implementation, non/partial achievement of the objectives, delays in completion of projects etc., which adversely impacted on the success of these projects.*
Training in remote sensing	*Indian Institute of Remote Sensing (IIRS), Dehradun, a unit of NRSC conducted customised professional courses towards capacity building in the application of remote sensing and geo informatics for natural resource management. We observed that there was an overall increase in the number of students trained by the IIRS. However, there was shortfall in the enrolment in long term courses. Further, the number of private persons trained for promoting the sale of data products was lower than participants from the Government sector. As a result, the objective of promoting the sale of data products to more and more private entrepreneurs was not fully met.*
Financial management	*There were substantial amount of unutilised balances available with NRSC under Government projects, despite which it continued to receive advances for special projects from DOS and from other government users. Budgeting of NRSC was not realistic indicating lack of control on income and expenditure and poor monitoring of projects. There was reduction of revenue/loss of interest due to irregular fixation/ delayed fixation of agency commission payable to Antrix Corporation Limited (ACL) in the sale of satellite data. Internal control and internal audit were not commensurate with the requirement of NRSC and there was a need to strengthen the same.*

What did we recommend?

Utilisation of remote sensing satellites, data acquisition and processing	***1.*** *NRSC/DOS may assess the need requirement of data in various thematic areas before planning and launching satellites and initiate action to maximise utilisation of remote sensing satellites already launched.* ***2.*** *NRSC/DOS may consider formulating a marketing policy and adhere to it to enhance revenue to cover at least operational cost.* ***3.*** *NRSC/DOS may also consider revising its archival policy to enhance utilisation of archived data.* ***4.*** *NRSC/DOS may prescribe ideal turn-around time for different categories of data.*
Sale of data products	***5.*** *With a view to maximising revenue, NRSC/DOS needs to take proactive steps to enhance usage of data products by private enterprisers in India.* ***6.*** *NRSC may streamline pricing of IRS data products, especially pricing of products sold internationally, by considering the pricing of similar products in international markets.*
Aerial remote sensing	***7.*** *NRSC, being the sole civilian provider of aerial surveys, may strengthen its efforts in improving operational efficiency of aircrafts by suitably addressing the causes of delays.*
Remote sensing application projects	***8.*** *NRSC/DOS, as an exclusive agency to provide remote sensing services, may associate themselves more closely with the planning and implementation of projects of national importance and of National Natural Resources Management System where remote sensing techniques are used to ensure realisation of expected benefits on time.* ***9.*** *NRSC/DOS may enter into appropriate MoU with ACL and collect all receivables from them. It should also enforce conditions of MoU with other government and private users to avoid overdues, undercosting etc.*
Training in remote sensing	***10.*** *NRSC may ensure planned level of enrolment in customised courses to fully utilise its training facilities. It should also encourage more private participants in its short-term courses, which would also encourage sale of its data products to them.*
Financial management	***11.*** *The efficiency of financial management processes should be improved to achieve more realistic budgeting and control so as to avoid locking up public funds.* ***12.*** *NRSC may streamline commission payable to ACL, avoid credit sales and streamline system for collection of receivables.* ***13.*** *Proactive action may be taken by NRSC to adjust outstanding advances paid to its work centres.*

What was the response of National Remote Sensing Centre to our recommendations?

National Remote Sensing Centre accepted most of the recommendations made by us. Recognising the criticality of the issues reported in the performance audit, National Remote Sensing Centre has submitted details of action already taken and action proposed to be taken on our recommendations. We appreciate the concern shown in recognising and promptly addressing the significant issues highlighted in the report. We hope that National Remote Sensing Centre would take appropriate actions to address these significant deficiencies.

Chapter 1 Introduction

Background

1.1 National Remote Sensing Centre[1] (NRSC), a unit of Indian Space Research Organisation (ISRO) is the nodal agency for remote sensing[2] activities, which involved acquisition and archival of satellite/aerial remote sensing data and its dissemination. The Remote Sensing Data Policy of India, 2001 vested NRSC with the sole authority to acquire and disseminate all remote sensing data in the country subject to specific guidelines stipulated to protect national security interests[3].

During the years 2003-04 to 2008-09, NRSC received grants from the Department of Space (DOS) and incurred an expenditure of ₹ 657.78 crore which was exclusive of the cost of satellites and their launching. During the same period, NRSC generated internal revenue of ₹ 528.25 crore from the sale

[1] Erstwhile National Remote Sensing Agency was an autonomous organisation under the Department of Space (DOS) upto August 2008. It was converted into a Government entity with effect from 1 September 2008 due to constraints faced by NRSC in dealing with programmes of national importance on account of its status of being a society.

[2] Remote Sensing is the science of acquiring information about the earth's surface without actually being in contact with it. This is carried out by sensing and recording reflected or emitted energy and processing, analysing and applying that information.

[3] Remote Sensing Data Policy of 2001 prescribes dissemination of data with resolution better than 5.8 meter, after being screened by a high resolution image clearance committee to protect national security interests. Data of 5.8 meter to 1 meter resolution could be distributed after screening and ensuring that sensitive areas are excluded. Data of 1 meter resolution could be distributed to the users without any restriction except for sensitive areas.

of data products and remote sensing application projects. From 1st September 2008, NRSC became a centre of DOS and, therefore, received money as budget allocation from DOS instead of grants-in-aid.

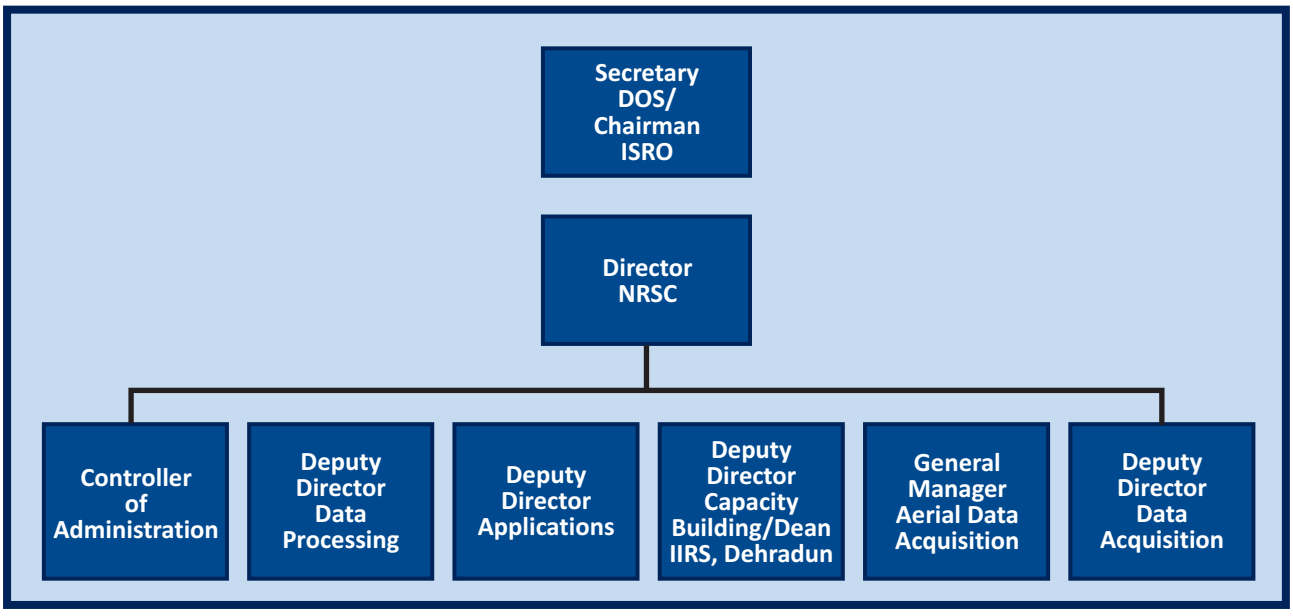
Activities

1.2 Major activities through which NRSC sought to achieve its objectives include:

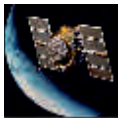
- Acquisition and processing of remote sensing data from various Indian and foreign remote sensing satellites and their supply to users in India and abroad;
- Airborne remote sensing for aerial photography, aero-magnetic survey and aerial laser terrain mapper etc; and
- Remote sensing application projects.

Organisational structure

1.3 ISRO is headed by a Chairman who is also the Secretary of the DOS. NRSC is an implementing unit of ISRO and is headed by a Director who, in discharge of his duties, is assisted by a Controller in-charge of administration, four Deputy Directors responsible for satellite data acquisition, data processing, applications, capacity building[4] and General Manager, aerial data acquisition. The Deputy Directors are assisted by Group Heads. The organisational structure is explained in the chart below.



[4] Deputy Director responsible for capacity building is also Dean, Indian Institute of Remote Sensing, Dehradun.



Chapter 2 Scope of Audit

Scope of Audit

2.1 The Performance Audit (PA) of activities of NRSC was conducted between June 2008 to May 2009 covering six years, from 2003-04 to 2008-09. Out of a total of 348 projects (132 Government Projects and 216 User Projects), we selected 105 projects (45 Government Projects and 60 User Projects) for audit scrutiny, on the basis of materiality of the projects.

Why we examined this issue

2.2 Remote sensing forms an important part of nation's space programme which helps in the efficient management of nation's resources in the fields of agriculture, water resources, urban development, disaster management etc. NRSC undertakes remote sensing application projects of national importance being part of National Natural Resources Management System (NNRMS), a body of the Planning Commission. Further, there was substantial investment of ₹ 2206 crore[5] towards cost of seven satellites and other related programmes. We selected NRSC for a Performance Audit as NRSC was the vital unit in the chain of activities involved in the design, development, realisation, launch and utilisation of remote sensing satellites in the country.

Audit objectives

2.3 The objectives of our audit were:

1. To assess the effectiveness of utilisation of the remote sensing satellites, acquisition and processing of remote sensing satellite data.
2. To assess whether the sale of data products resulted in maximisation of revenue.
3. To assess effectiveness of airborne remote sensing and completion of projects on time.
4. To assess whether the remote sensing application projects were helping in the efficient management of national resources in the fields of agriculture, water resources, urban development and disaster management.
5. To assess whether adequate training on remote sensing was imparted to ensure effective usage of data products.
6. To assess whether the financial management was effective in aiding NRSC in carrying out its mandated activities.

[5] ₹ 1469 crore towards the cost on seven satellites in operation and ₹ 737 crore towards expenditure on earth observation programme during 2003-08.

Audit criteria

2.4 The criteria for performance evaluation were derived by us from the following:

- Directions from Governing Body of NRSC, its Finance Sub-Committee, Planning Committee of Earth Observation Programme and Project Coordination Committee.
- Agreements of activities of the projects, expected projections of satellite performance and declared objectives.
- Annual budget, five year plans, accounting standards, costing policy, self-sustenance policy, remote sensing data policy etc.

Audit methodology and sample selection

2.5 Prior to taking up the Performance Audit, we discussed the scope of audit, objectives and criteria with NRSC in the Entry Conference held on 20 June 2008. We examined the selected project files and analysed data products during the period June 2008 to May 2009. We communicated our findings in May 2009 to DOS for response. After considering their response in July 2009, we held an Exit Conference in December 2009 to discuss conclusions and recommendations. NRSC furnished their responses to the conclusions and recommendations in February 2010. We have incorporated the responses of NRSC appropriately in the report. Most of our recommendations have been accepted by NRSC and they have also proposed an action plan to implement these recommendations.

Acknowledgement

2.6 We acknowledge the cooperation and assistance extended by the management of NRSC and DOS/ISRO at various stages of the Performance Audit.

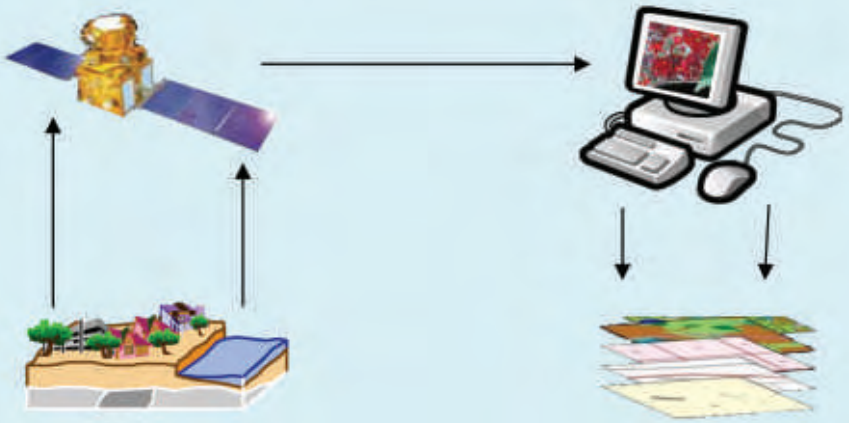
Organisation of audit findings

2.7 Our audit findings, conclusions, responses from NRSC/DOS, our recommendations and action plan of NRSC thereon are discussed in the Chapters 3 to 8 of this report.

Chapter 3 of this report discusses capacity utilisation of remote sensing satellites, returns from these satellites, need assessment, issues relating to acquisition and processing of data. While **Chapter 4** covers sale of data products to domestic and international users, **Chapter 5** brings out issues regarding efficiency of NRSC aircrafts in carrying out aerial remote sensing projects. **Chapter 6** of this report discusses issues in the implementation of remote sensing application projects undertaken by NRSC. **Chapter 7** covers issues relating to training in remote sensing and **Chapter 8** discusses financial management issues.

Chapter 3 Utilisation of remote sensing satellites, data acquisition and processing

Audit Objective 1: To assess the effectiveness of utilisation of the remote sensing satellites, acquisition and processing of remote sensing satellite data.



Data acquisition and Processing

3.1 NRSC was mainly acquiring remote sensing data from seven Indian Remote Sensing (IRS) satellites, and a few other foreign satellites like LAND SAT[6], NOAA[7], MODIS[8], ERS[9], IKONOS[10], QUICK BIRD[11] and RADARSAT[12].

The earth station complex located at Shadnagar, Andhra Pradesh acquires satellite data from all Indian and a few foreign satellites. Data recorded on digital media is transferred for archiving and general application in NRSC. The browsed and ancillary data is also transmitted from Shadnagar to NRSC using Spacenet[13], which is accessible to data users for browsing and data ordering. Thereafter, the NRSC Data Centre (NDC) sells data products based on the requests/ orders of users.

The details of IRS satellites are given in **Table 1.**

[6] LANDSAT is a series of earth observing satellite mission jointly managed by National Aeronautics and Space Administration (NASA) and the United States Geological Survey.

[7] NOAA is the satellite launched by National Oceanic and Atmospheric administration of United States Department of Commerce.

[8] Moderate Resolution Imaging Spectro-radiometer (MODIS) is a key instrument aboard the Terra and Aqua Satellites of NASA of United States of America (USA).

[9] It is a series of earth observing satellites of European Space Agency.

[10] IKONOS is the high resolution commercial remote sensing satellite of the company Space Imaging/GeoEye, USA.

[11] QUICKBIRD is the high resolution commercial remote sensing satellite of the company Digital Globe, USA.

[12] RADARSAT is a series of commercial earth observing satellite of Canada.

[13] Spacenet is a Wide Area Network for ISRO/DOS through satellites.

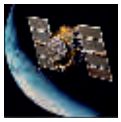


Table 1
Indian Remote Sensing Satellites in Operation during 2003-08

(Amount: ₹ in crore)

No.	IRS Satellite	Date of Launch	Launch Vehicle	Launch Vehicle	Years in operation	Purpose
1	IRS – 1C	28 December 1995	Molniya[14]	124.93	12	Operational
2	IRS - P 3	21 March 1996	PSLV-D3	76.62	11	Experimental
3	IRS - 1D	29 September 1997	PSLV-C1	203.93	10	Operational
4	Oceansat 1 - P 4	26 May 1999	PSLV-C2	158.75	8	Operational
5	Resourcesat-1 – P6	17 October 2003	PSLV-C5	252.58	5	Operational
6	Cartosat 1 - P 5	5 May 2005	PSLV-C6	359.49	3	Operational
7	Cartosat-2 P7	22 January 2007	PSLV-C7	292.29	1	Operational

Capacity utilisation of IRS satellites

3.2 The performance of the satellite depends on factors like the design capacity[15] of the satellites, elevation and the visibility circles and pay loads on the spacecraft such as number of sensors onboard and the availability of 'On Board Solid State Recorder'. The performance of the satellite is primarily assessed by the number of scenes that have been acquired. The earth stations of NRSC acquire the scenes[16] captured by a satellite when the satellite passes above NRSC earth stations.

Though designed capacity of each satellite was requested for, NRSC did not furnish the same and instead indicated the data product generation capability of the earth station as the designed capacity of the satellite. Due to absence of designed capacity of each satellite, the performance of each satellite with reference to their designed capacity could not be assessed by Audit.

We further observed that there was a gap between scenes captured by the satellite and scenes acquired by earth station (data product generation capability) due to the constraints of the capacity of the earth stations. While admitting that the capacity of the earth stations was a bottleneck, DOS stated in December 2009 that data product generation capability of NRSC was augmented to acquire more scenes by establishing a polar earth station facility at Svalbard, Norway.

In the absence of designed capacity of the satellite, actual number of scenes acquired by earth station during the period 2002-03 to 2007-08 was compared against maximum number of scenes acquired in any of the above years (actual average capacity utilisation against maximum capacity utilisation) as detailed in **Table 2.**

[14] A Russian launch Vehicle.

[15] The capacity of a satellite to acquire certain amount of scenes is called its designed capacity.

[16] Scenes are minimum chargeable units/area based on technical/orbital parameters of each satellite. In respect of high resolution satellites, one scene has been standardised as one square kilometer.

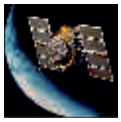


Table 2

Capacity Utilisation of Remote Sensing Satellites in Operation during 2002-08

No.	IRS (Year of Launch)	Maximum Capacity Utilisation*	Actual average capacity utilisation	Percentage of actual average capacity utilisation against maximum capacity utilisation
		Scenes per year		
(a)	(b)	(c)	(d)	(e) = (d)/(c)
1	I C (1995)	48141	21780	**45**
2	P 3 (1996)	7200	2270	**32**
3	I D (1997)	32833	22174	**68**
4	P 4 Oceansat-1 (1999)	2880	1416	**50**
5	P 6 Resourcesat-1 (2003)	280908	155119	**56**
6	P 5 Cartosat-1 (2005)	111026	93619	**84**
7	P 7 Cartosat-2 (2007)	52140	28716	**55**

* It is the maximum number of scenes acquired in any of the 6 years under review or data generation capability of NRSC whichever is higher.

Further details pertaining to year-wise scenes acquired during the same period are given in **Annex-1**.

It can be observed from the table that three out of seven satellites (IRS - P3, IC and P4) could utilise only 32, 45 and 50 *per cent* of their maximum capacity.

NRSC replied in September 2008 that P3 was an experimental satellite and stopped functioning in 2003. DOS attributed the underperformance of P4 in July 2009 to *'onboard spacecraft power constraints'* from the end of 2001.

Thus, due to technical problems in the spacecrafts, the satellites could not be put to use to their maximum capacity. NRSC/DOS did not assess the impact of lower capacity utilisation on remote sensing applications projects of national importance.

Recovery of expenditure/ Return on Investment

3.2 The proposal to launch remote sensing satellites is approved taking into account user requirements and data needs. For calculating Return on Investment (ROI), the capital expenditure on launch of remote sensing satellites and the yearly expenditure on operations & maintenance of satellites is compared with the revenue to be generated from the sale of data products generated from each satellite.

We also observed that no benchmark relating to recovery of expenditure incurred or ROI was fixed by DOS. The total capital expenditure on the seven satellites in operation during the review period was ₹ 1468.59 crore.

The operational returns from these satellites during the period 2003-08 are detailed in **Table 3**.

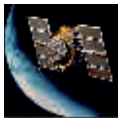


Table 3

Operational Returns of Indian remote sensing satellites

(Amount: ₹ in crore)

Year	Operational Expenditure	Income from the sale of data products*	Operational Returns	Percentage of 'Income from sale of data products' to 'Operational Expenditure'
(1)	(2)	(3)	(4) = (3) - (2)	(5) = (3)/(2) *100
2003-04	117.84	20.97	(-) 96.87	17.80
2004-05	133.87	26.19	(-) 107.68	19.56
2005-06	149.27	29.78	(-) 119.49	19.95
2006-07	173.16	38.89	(-) 134.27	22.46
2007-08	163.13	42.63	(-) 120.50	26.13
Total	**737.27**	**158.46**	**(-) 578.81**	**21.49**

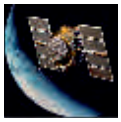
* Inclusive of the sale of data products to international customers through Antrix Corporation Limited (ACL).

It can be seen from the table that:

- Operational returns were negative in all the years and ranged from ₹ 96.87 crore to ₹ 134.27 crore indicating that realisation from sale of data products was not sufficient to even match its yearly operational expenditure. Percentage of Income from sale of data products to operational expenditure was very low and ranged from 17.80 *per cent* to 26.13 *per cent* with the average of 21.49 *per cent*. The under recovery of operational expenditure was ₹ 578.81 crore during 2003-08. All the seven remote sensing satellites in operation during the period 2003-08 were, therefore, not revenue neutral.
- Further, the capital Investment of ₹ 1468.59 crore made on seven operational satellites could not be recovered in the absence of any positive operational return during the period 2003-08. The recovery percentage of total expenditure incurred was mere 7.18 *per cent* as revenue generation was only ₹ 158.46 crore as against total expenditure of ₹ 2205.86 crore.

Thus, there is a need to improve the generation of revenue by sale of data products. This will help to increase the percentage of income from sale of data products to operational expenditure and ensure the long term sustainability of the programme.

NRSC replied in September 2008 that the price of the satellite data had been arrived at by considering only the operational cost of the satellite data product generation at NRSC. The cost of segments such as launch vehicles, satellite fabrication, etc., was not considered. Without quantifying intangible benefits, NRSC added that ROI should also consider the intangible benefits accrued through the utilisation of the satellite data.



The reply of NRSC is not acceptable, since recovery of operational cost averaged at 21.49 *per cent* only as against full recovery because sale price of data products was based on recovery of operational cost. NRSC needs to recognise and consider all associated costs for arriving at the cost of the data products. It also needs to revisit its operational policy with a view to at least recover operational costs.

Data need assessment

3.4 Data need assessment in various remote sensing applications such as resource survey[17], mapping applications[18], oceanographic applications[19], etc., is to be made to help in planning the payloads of operational remote sensing satellites prior to launch.

We scrutinised the files[20] containing proposals for launch of IRS–P4, P5 and P6 satellites and observed that data need assessment on various thematic areas was not carried out for these satellites. DOS did not make available proposal files of IRS-IC, ID & P7 satellites in the absence of which we could not ascertain whether or not thematic data need assessment was carried out for these satellites.

We also requested for information in August 2008 on theme-wise data need and data supply in the areas of urban planning, drought monitoring, land use & land cover mapping, underground water resource mapping, mineral prospecting, environmental impact analysis etc., to examine the process being followed by NRSC in carrying out such exercise. NRSC expressed their inability in furnishing theme-wise data assessment and sales figures and replied in October 2008 that it had plans to collect information on themes in the future. Thus, we could not assess the extent of data gap against the data need in specific areas.

DOS, while noting the audit observation, replied in July 2009 that in future, efforts would be made to collect information on the intended use for data products disseminated by NRSC.

Data Acquisition Facility

3.5 NRSC reported in July 2008 that operational efficiency of Shadnagar earth station was 98 *per cent*.

The details of passes[21] captured during the year and the number of passes/portion of passes not captured by data acquisition during the year is detailed in **Table 4**.

[17] Surveying resources of earth such as vegetation, water, mines, hydrocarbon etc.

[18] Mapping geographical and political boundaries which would normally help in rural/urban planning, coastal land use and regulation, utilities mapping and other various cartographic applications.

[19] Mapping of the resources, terrain, movements etc., of the ocean.

[20] Proposals relating to IRS-P3 were not scrutinised as it was an experimental satellite.

[21] Number of occasions on which the earth station captured data when satellites passed over the station.

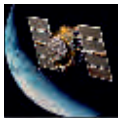


Table 4
Satellite passes covered

Sl. No.	Year	Total passes captured[22] by the earth station	Number of Satellites involved	Passes not captured by the earth station
1	2003-04	6205	05	127
2	2004-05	6205	05	127
3	2005-06	6570	05	134
4	2006-07	6935	06	142
5	2007-08	7665	06	157
6	2008-09	6730	06	68
		40310		**755**

From the table, it can be seen that even though the number of passes not captured by the Shadnagar earth station was only 126 passes[23], the number of passes not captured showed an increasing trend from 127 in 2005-06 to 157 in 2007-08. However, the position improved in 2008-09. NRSC replied in September 2008 that number of passes not captured was due to very low elevation passes and occasional overhead passes which led to data losses and that it was natural in any operational scenario of remote sensing satellites data reception.

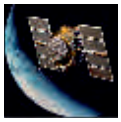
We also observed that scenes acquired from IRS satellites averaged 273641 per year during the period 2002-08. However, the number of scenes acquired reduced to 30 *per cent* during 2008-09. NRSC did not furnish reasons for sudden fall of 70 *per cent* in the acquisition of scenes of IRS in 2008-09.

DOS replied in July 2009 that operational efficiency above 95 *per cent* is the accepted benchmark. It added that NRSC earth station had only three antennae against which it was acquiring scenes from seven Indian Remote Sensing Satellites. It further stated that in case of known operational problems of one antenna, other can be configured to accept satellite passes. DOS further replied in December 2009 that data product generation capability of NRSC was augmented due to establishment of a polar station facility at Svalbard, Norway and, therefore, NRSC could acquire more scenes.

Reply of DOS underlined the fact that data product generation capability of NRSC was below the full capacity of the satellites to acquire and generate scenes. Hence there was a need to review and augment the data acquisition capacity of NRSC after conducting a realistic data need assessment.

[22] Considering the number of days in a year as 365.

[23] During the period 2003-04 to 2008-09, the number of passes not captured was 755. The average passes not captured during the 6 years works out to 126 (755 divided by 6).



Utilisation of acquired data

3.6 NRSC had a system of archiving the data acquired by the operational Indian and foreign satellites. According to NRSC's archival policy of 1998 which was revised in December 2004, previous five years data were to be retained without purging. The data acquisition policy which was part of data archival policy stipulated that acquisition and archival of data depended on the following three aspects:

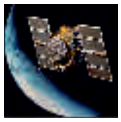
- Cloud free data sets for different application requirements.
- Cost of data acquisition vis-à-vis potential sales.
- Archived data sets which are unique in their characteristics.

Details of the scenes acquired, sold, revenue realised etc., are given in **Annex-2**. From these details, we observed the following:

- The percentage of idling of the acquired data ranged from 53 to 95 *per cent* in IRS, 92 to 99 *per cent* in MODIS, 68 to 97 *per cent* in NOAA satellites during 2002-09.
- The extent of such unutilised data from IRS satellites was high and increased from 69 *per cent* in 2002-03 to around 89 *per cent* in 2007-08. Only in 2008-09, the idling of data reduced to 53 *per cent*.
- Though data acquisition and archival policy stipulated acquisition of cloud free data and data acquisition based on potential sales basis, the low utilisation of acquired data is indicative of the fact that the data need assessment was not based on any scientifically conducted user requirement. NRSC did not furnish details of marketing strategy and action plan aimed at improving utilisation of acquired satellite data.
- According to NRSC archival policy, the policy was to be revised once in five years. NRSC also spent ₹ 41 lakh towards recurring storing charges of the archived data during 2004-08 in addition to payment of salary towards technical staff[24] of the archival wing. NRSC did not revise its archival policy after December 2004, as of January 2010.

DOS replied in July 2009 that NRSC had made wide publicity to the user community on the availability of such archived data-sets at reduced prices. The efforts of NRSC included participation in important geospatial workshops, release of advertisements in geospatial/general magazines and conducting user meets.

[24] The archival policy stipulated a manpower requirement of 38 technical staff (13 engineers and 25 technical assistants).



The reply of DOS needs to be viewed in the context that the operational remote sensing satellites were launched with a specific designed capacity to meet the data needs of the country and the region. Therefore, data acquired should have been adequately utilised if the data need assessment was realistic. In addition, the Tenth Five Year Plan document had also envisaged a quantum jump in technological ability, application expansion, aggressive marketing and virtual dissemination of knowledge keeping in mind the requirements of remote sensing user community in the country and the region. The fact remained that idling in IRS data was high and was between 53 and 95 *per cent*.

Data Processing Facility

3.7 The efficiency of the data processing facility is measurable in terms of turn-around time[25]. One of the goals for Tenth Five Year Plan period (2002-07) was to supply high quality products from various satellites with improved turn-around time. The turn-around time achieved during 2002 to 2009 was as detailed in **Annex-3**.

NRSC fixed turn-around time of three days for standard products and five days for some specialised products. We observed that the turn-around time did not improve during 2002 to 2009. In addition:

- Data processed within one day decreased from 15.9 *per cent* in 2002 to 5 *per cent* in 2008 and 9.7 *per cent* in 2009.
- Data processed within one week (one day to seven days) decreased from 55.9 *per cent* in 2002 to 26.5 *per cent* in 2009.
- Data processed upto two weeks (one week to two week) increased from 16.5 *per cent* in 2002 to 30.7 *per cent* in 2009.
- Data processed upto one month (two week to one month) increased from 7.9 *per cent* in 2002 to 32.2 *per cent* in 2009.

Thus, turn-around time was increasing during the review period, pointing to the decline in efficiency of data processing.

DOS replied in July 2009 that even with increased complexity of the missions and complying totally with Remote Sensing Data Policy (RSDP), NRSC was able to supply the data products to the users within reasonable time. Reply of DOS has to be viewed in the background of the fact that though the RSDP of 2001 made data supply easier, processing time taken by NRSC had increased during the period under review.

We also observed that NRSC had spent ₹ 5.79 crore during 2003-08 on automation, establishment of new facility/ upgradation of existing facility in the data processing area and to equip the facility with the needs of every new satellite launched. Despite this substantial investment, NRSC was not able to make any significant improvements in turn-around time, as envisaged in Tenth Five Year Plan.

[25] Turn-around time is the processing time required to process the data into a deliverable finished product from the time of receipt of request for data.

National Remote Sensing Coordination Committee

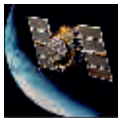
3.8 The Standing Committee of Parliament on Department of Space observed in August 2004 that in order to increase accuracy of IRS data and also for more realistic interpretation of acquired data, DOS needed to set up National Remote Sensing Coordination Committee to facilitate holistic implementation of the following proposals:

- Integration of Geographical Information System (GIS), Global Positioning System (GPS) and IRS technology to enhance accuracy of derived data.
- Production and distribution of satellite data.
- Processing of remote sensing data.
- Using functional approach towards difficulties faced by departments for accurate interpretation of the data retrieved.
- Updating of technology at par with world standards.
- Promotion of remote sensing applications in coordination with universities and research centres.
- Maintenance of national archive on remote sensing data with a view to preserving data and also constantly updating it.

We observed that the National Remote Sensing Coordination Committee, which was to ensure holistic implementation of remote sensing data, was not yet set up. NRSC stated in September 2008 that different committees such as NRSC Data Centre–Data Processing Coordination Committee were instituted to discuss various issues on data product generation and user requests. Reply of NRSC is to be viewed in the context of specific recommendation of the Standing Committee of Parliament to constitute a single committee to address several issues.

Conclusion

The performance of three out of the seven remote sensing satellites was below their maximum capacity in terms of remote sensing satellite data captured by them. The revenue realised from seven satellites in operation was not up to the desired level. The satellites were planned without adequate thematic data need assessment. Idling of acquired IRS data was high due to non-adopting of appropriate marketing strategy. While there was a need to review and augment data acquisition capacity of NRSC after conducting a realistic data need assessment, there were also delays in data processing impacting the delivery of available data products.



Our Recommendations	Action proposed by NRSC on recommendations
1. NRSC/DOS may assess the need requirement of data in various thematic areas before planning and launching satellites and initiate action to maximise utilisation of remote sensing satellites already launched.	*NRSC stated in February 2010 that along with other stakeholders of National Natural Resource Management System (NNRMS), they would continue to strive to make the periodic assessment of its user requirements through more frequently convened NNRMS Standing Committees. NRSC also stated that they would launch more awareness and capacity building programmes for the users to make use of the newer products and services of the satellite missions, particularly the missions launched recently such as RISAT-2 and Oceansat-2; and the newer ones planned in the immediate future such as Resourcesat-2, RISAT-1, Megha-Tropiques, and SARAL. It added that a focused programme was being drawn to build necessary infrastructure augmentation at the State Remote Sensing Applications Centers as well as build necessary human resources skill for making use of the satellite data and the derived information at local level for decentralised planning.*
2. NRSC/DOS may consider formulating a marketing policy and adhere to it to enhance revenue to cover at least operational cost.	*NRSC stated in February 2010 that it planned to devise means to:* ● *enhance operational efficiency and effective product delivery mechanism,* ● *work out a document consolidating existing practices, competition, future opportunities, challenges, perceptions of user agencies to work out appropriate marketing strategy/ action plan for the coming years, and* ● *set up a Customer Relationship Management (CRM) / marketing cell in the near future working together with Antrix Corporation Limited.*
3. NRSC/DOS may also consider revising its archival policy to enhance utilisation of archived data.	*NRSC agreed in February 2010 that it was planned to re-visit the archival policy during 2010 and efforts would be made to publicise availability of archived data through NRSC website, generation of brochures/ leaflets etc.*

Our Recommendations	Action proposed by NRSC on recommendations
4. NRSC/DOS may prescribe ideal turn-around time for different categories of data.	*NRSC stated in February 2010 that it planned to implement the new technological initiative i.e., 'Integrated Multi-mission Ground Segment for Earth Observation Satellites' by 2012. The turn-around time was expected to improve significantly with the emergency products being delivered in a few hours and most of the standard products to be generated in 24 hours.*

Chapter 4 Sale of data products

Audit Objective 2: To assess whether the sale of data products resulted in maximisation of revenue.

Sale of data products

Sale of data products

4.1 Remote Sensing Data Policy in 2001 opened up the sale of data products on non-discriminatory basis to customers. NRSC, therefore, was to take this opportunity and understand the requirements of the private customers to customise its products and services to suit the requirements of the private customers and increase the sale of data products to make remote sensing data utilisation programme sustainable. The Standing Committee of Parliament on DOS for the year 1996-97 observed that *'remote sensing is developing into a major source of activity for national development. There is a large magnitude of value addition to the remote sensing data which could be used in marketable form in several disciplines, in Government and Non-Government. Therefore, committee felt that more and more private entrepreneurs should be associated in the process of remote sensing data utilisation programme'.*

In this context, the sector wise details of satellite data products sold during the period 2003-04 to 2008-09 are given in **Table 5**.

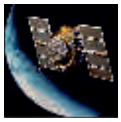


Table 5
Data Product Sale

(Amount: ₹ in crore)

Sector	Government Sector[26]		Private Customers[27]		Total	
	Number of products (*per cent*)	Revenue realised (*per cent*)	Number of products (*per cent*)	Revenue realised (*per cent*)	Number of products	Revenue realised
2003-04	14723 (83)	19.83 (81)	3081 (17)	4.58 (19)	17804	24.41
2004-05	16317 (86)	29.54 (85)	2750 (14)	5.14 (15)	19067	34.68
2005-06	16996 (86)	30.05 (85)	2709 (14)	5.28 (15)	19705	35.33
2006-07	23087 (87)	36.79 (88)	3391 (13)	5.07 (12)	26478	41.86
2007-08	31291 (85)	39.73 (83)	5510 (15)	8.22 (17)	36801	47.95
2008-09	32997 (79)	32.22 (78)	8571 (21)	9.3 (22)	41568	41.52

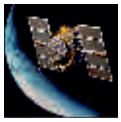
Even though the sale to Private Sector increased marginally[28], we observed that the average sales to the Private Sector was less than 20 *per cent* whereas the sales to the Government Sector was more than 80 *per cent* during the period 2003-09.

DOS replied in July 2009 that the Private Sector procured high resolution data, mainly for infrastructure and utility mapping applications and this was made available by the launch of Cartosat 1 and 2 satellites. Reply of DOS needs to be viewed in the context of the comparative low sales in Private Sector and the recommendation of Standing Committee of Parliament on DOS regarding increase in sales to the Private Sector. Also, high resolution data was available through IRS 1C as early as from 1995. Further, despite launch of Cartosat-1 in May 2005 and Cartosat-2 in January 2007, the sale in Private Sector did not increase significantly. This indicated that the efforts of NRSC were not adequate in customising the data according to the needs of private users and also in exploring the possibility of widening the customer base.

International rate of data products

4.2 Indian remote sensing data products are sold to Indian customers (including those in SAARC countries) directly by NRSC. For international customers, NRSC sells data products through ACL at 2.5 times the Indian price. This price includes ACL's agency commission of 100 *per cent*. NRSC also procures foreign satellite data directly from RADARSAT, IKONOS, QUICKBIRD, etc., on demand.

[26] DOS/NRSC, Central & State Governments.
[27] Academic, Private and Foreign Customers.
[28] During the period 2007 to 2009.



We observed that the prices charged by NRSC for high resolution IRS data products sold to ACL ranged between US $ 0.08 and US $ 2.5 per square kilometer. For the same high resolution data products, ACL charged between US $ 0.16 and US $ 8.6 which works out to an average of US $ 4.38 in the international market. In comparison, the charges for similar high resolution data in the international market, which is based on market trends, ranged between US $ 17 and US $ 35 per square kilometer which worked out to an average of US $ 26. Thus, the international market rate of high resolution satellite data was about six times[29] that of the price of IRS data. The comparison of rates of IRS with the international rates for similar products is given in **Table 6**.

Table 6

Comparison of International Price with IRS prices for data products

(Amount: ₹ in crore)

Year	Sales value of IRS products (international sales)	Sale value of IRS data product at average international market price	Difference
(1)	(2)	(3) = (2)*26/4.38	(4) = (3) - (2)
2004-05	1.46	8.67	7.21
2005-06	1.94	11.52	9.58
2006-07	1.96	11.63	9.67
2007-08	4.26	25.29	21.03
Total	**9.62**	**57.11**	**47.49**

It can be seen from the above table that the prices of high resolution satellite data in the international market were six times more than the prices of comparable IRS products. There was, therefore, scope for enhancing the revenue from the sale of data products to international customers by ₹ 47.49 crore.

DOS stated in July 2009 that missions with similar resolution and products type should be considered for meaningful comparison. It was also stated that while pricing the Cartosat-2 products, a strategic pricing policy had to be adopted to help penetrate the global market.

The reply of DOS needs to be viewed in light of the fact that the comparison was made only on the basis of prices of similar and comparable high resolution (black and white) data. There is, therefore, a need to streamline pricing of IRS data products for international customers. This will also enhance the revenue from remote sensing satellites.

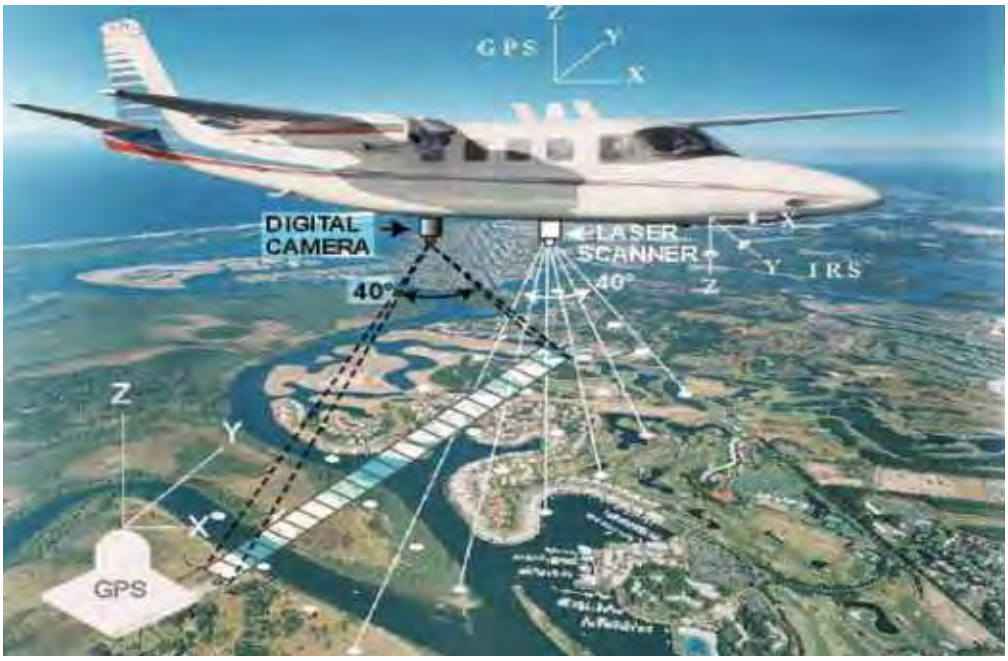
[29] The average price of high resolution (Black & White) data in the international market, viz., US $ 26 is about six times of US $ 4.38 being the price of similar IRS data.

Conclusion	The efforts of NRSC were not adequate in customising the data according to the needs of private users and also in exploring the possibility of widening the customer base. The sale of data products to private users did not improve as recommended by Standing Committee of Parliament of DOS. Further, there was scope for enhancing the rates of IRS data products in line with international rates.

Our Recommendations	Action proposed by NRSC on recommendations
5. With a view to maximising revenue, NRSC/DOS needs to take proactive steps to enhance usage of data products by private enterprisers in India.	*NRSC stated in February 2010 that it would continue to strive to hold hands with private entrepreneurs in enhancing their skill-sets to handle satellite data products and services. It was also planned to enhance their participation in the training programmes and maximise the products and services including application services dissemination to the user community through web-based portals.*
6. NRSC may streamline pricing of IRS data products, especially pricing of products sold internationally, by considering the pricing of similar products in international markets.	*NRSC stated in February 2010 that they would periodically revisit the pricing policy and restructure the same keeping in mind the costing principles and the pricing strategy in tune with the user aspirations and market sentiments. NRSC also stated that it was in the process of entering into a Memorandum of Understanding (MoU) with ACL for international distribution of satellite data. The draft of the MoU was being finalised and was expected to be ready shortly.*

Chapter 5 Aerial Remote Sensing

Audit Objective 3: To assess effectiveness of airborne remote sensing and completion of projects on time.



Aerial Remote Sensing

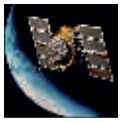
5.1 NRSC was the sole civilian provider of aerial remote sensing services in the country. These aerial projects were meant for remote sensing specific areas at required times, which is not possible through satellites. Two beach-craft aircraft equipped with navigation aids, state-of-the-art sensors like LIDAR[30], digital camera based aerial photography systems and airborne magnetometer for aerial data acquisition and ground instrumentation were utilised for airborne remote sensing.

Delay in completion of aerial projects

5.2 During review period, NRSC undertook 67 aerial remote sensing projects and completed 45 projects. Out of 67 projects, we selected 36 projects for detailed scrutiny based on materiality.

Our scrutiny revealed that 12 aerial projects (33 *per cent*) costing ₹ 45.85 crore were delayed from 8 to 54 months due to various reasons such as scarcity of pilots due to boom in aviation market, non-receipt of payment from the users, unfavourable weather conditions, naxalite problems and technical snags in the aircraft.

[30] Light Detection and Ranging.



We further observed that:

- In two major projects[31], NRSC did not charge for the additional work and escalation in time, though the delay was attributable to the users.
- One of the selected projects[32] was kept in abeyance after spending ₹ 4.64 crore due to non-furnishing of inputs by the user.
- In another project[33], there was in-ordinate delay in completion of the work by three years and eight months due to change in specification by the user.
- In the remaining eight projects though there was delay in completion, no cost escalation was involved.

As regards delay in completion of the projects, DOS replied in July 2009 that final classification of data from Survey of India took considerable time since security vetting from various agencies in Ministry of Defence is a sequential process. Reply of DOS is not acceptable since the aspect of time required for statutory clearance should have been considered at the proposal stage before finalising the timelines of the projects.

Utilisation of aircrafts

5.3 The performance of two aircrafts in operation in terms of actual flying hours during 2003-09 is given in **Table 7**.

Table 7
Utilisation of aircrafts

No.	Aircraft	Actual flying hours (*per cent*)					
		2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1	VT-EQK	296	127	220	149	275	410
		(72)	(31)	(54)	(36)	(67)	(100)
2	VT-EBB	276	461	253	89	317	355
		(60)	(100)	(55)	(19)	(69)	(77)
	Total	**572**	**588**	**473**	**238**	**592**	**765**

It can be seen from the table that against its maximum ability of 461 flying hours, VT-EBB could perform only 19 to 77 *per cent* of its maximum ability during 2003-09 except for the year 2004-05. Similarly, aircraft VT-EQK could perform only 31 to 72 *per cent* of its maximum ability of 410 flying hours except during 2008-09.

[31] Large Scale Mapping of 11 towns of Andhra Pradesh Urban Services for Poor, Aerial photography of 16 places in Karnataka for Karnataka State Remote Sensing Application Centre, Bangalore.

[32] Aerial Large scale Terrain Mapping for Garland command and catchment area for Water Resources Development Organisation.

[33] Aerial photography and mapping over Kolkata Municipal Corporation.

NRSC, while admitting the underperformance of the aircrafts, replied in September 2008 that idling was due to problems such as non-availability of pilots due to boom in aviation market and frequent snags in the aircraft due to their ageing and difficulty in procurement of spares. It was also stated that two pilots available with NRSC had resigned and it was managing with freelance pilots. NRSC added in September 2008 that Indian Air Force (IAF) was approached for deputing some pilots. DOS replied in July 2009 that the peak performance of the individual aircraft could not be assumed to be the annual average capacity.

Reply of DOS is to be viewed in the background of the fact that we had compared the actual performance against the peak performance of these aircrafts in any of the six years in the absence of any other available benchmarks.

Thus, non-utilisation of aircrafts to its maximum capacity due to problems such as non-availability of pilots, maintenance/ repair of aircrafts etc., had impacted airborne remote sensing and 12 out of 36 aerial projects test checked were delayed. This impacted the efficiency of NRSC in completing aerial projects in time as detailed in **Annex 4** and paragraph 6.4.1 of the report.

Conclusion

Aircrafts performing the task of aerial remote sensing could not be put to use to their maximum capacity mainly due to non-availability of pilots and technical snags in the aircrafts. As a result, one third of aerial projects test checked were delayed.

Our Recommendations	Action proposed by NRSC on recommendations
7. NRSC, being the sole civilian provider of aerial surveys, may strengthen its efforts in improving operational efficiency of aircrafts by addressing suitably the causes of delays.	*NRSC stated in February 2010 that it had brought in place in 2009, a wet leasing mechanism involving deployment of skilled private entrepreneurs in the campus under the direct supervision of NRSC to expedite data processing for project execution well in time. NRSC added that they were streamlining procedures for speedier clearance from Ministry of Defence and Survey of India for its flying tasks and classification of data, respectively. It further stated that to ensure stringent compliance, a mechanism for entering into an MoU with project sponsoring agencies had since been institutionalised and that it would ensure that all the conditions of MoU (inclusive of financial terms) were adhered to in future.*

Chapter 6 Remote Sensing Application Projects

Audit Objective 4: To assess whether the remote sensing application projects were helping in the efficient management of national resources in the fields of agriculture, water resources, urban development and disaster management.

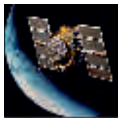
Remote sensing satelite data

Responsibility of NRSC in undertaking Remote Sensing Application Projects

6.1 NRSC was responsible for enhancing the use of modern remote sensing technique by providing support for conceiving the idea of use of remote sensing techniques, planning, execution and ultimate use of outputs in various areas. Further, NRSC was also responsible for providing operational resource survey services to users by utilising modern remote sensing techniques. In this background, the National Natural Resources Management System (NNRMS) was set up in 1983 under the aegis of Planning Commission, Government of India to carry out the Indian Earth Observation Activities and was mandated to address the specific issues pertaining to applications of remote sensing in different thematic areas. Department of Space was made the nodal agency responsible for carrying out mandate of NNRMS and the Secretariat of NNRMS was housed in the ISRO Headquarters, Bangalore.

The Planning Committee of NNRMS (PC-NNRMS) oversees the end-to-end programme and provides necessary guidance for the implementation of the programme. Nine high-power Standing Committees[34] constituted under NNRMS are mandated to address the specific issues pertaining to applications of remote sensing in different thematic areas. Each of these Standing Committees is chaired by Secretary of the respective Government departments and include experts from major user departments/ agencies. While PC-NNRMS takes up some programmes directly to be implemented by

[34] (i) Agriculture and Soils (ii) Bio-Resources and Environment (iii) Geology and Mineral Resources (iv) Water Resources (v) Ocean and Meteorology (vi) Cartography and Mapping (vii) Urban Management (viii) Rural Development and (ix) Training and Technology.



NNRMS, its Standing Committees take up programmes/ projects relating to thematic areas.

NRSC, besides being one of the implementing agencies, was a member/member secretary of different Standing Committees of NNRMS, which coordinated the projects of national importance. The role of NRSC, therefore, extended to ensuring, by obtaining periodical feedback from users, that the deliverables supplied by them to other agencies implementing the projects of national importance were effectively utilised. We, however, observed that NRSC did not play a proactive role in ensuring that the project objectives were fully achieved. We also observed that the various Standing Committees of NNRMS did not meet periodically to coordinate and monitor implementation.

Projects undertaken by NRSC

6.2 Projects undertaken by NRSC were of two kinds i.e., projects of national importance under NNRMS and operational projects which were undertaken for various users including ACL. The projects of national importance under NNRMS which were coordinated by the Standing Committees of NNRMS were:

(i) Study on Command Area Development.

(ii) National Wasteland Mapping.

(iii) Rajiv Gandhi National Drinking Water Mission.

The projects of national importance directly implemented by NNRMS through various DOS/ISRO units including NRSC were:

(i) Village Resource Centre Programme.

(ii) Disaster Management Support Programme.

Audit findings in respect of projects of national importance are discussed in the paragraphs 6.2.1 to 6.2.5. The audit findings with respect to operational projects are discussed in paragraphs 6.3 and 6.4.

Study on Command Area Development

6.2.1 Based on a proposal of NRSC, a project costing ₹ 2.25 crore was entrusted to it in December 1997 for completion in December 1999 by Ministry of Water Resources. The project was coordinated by NNRMS Standing Committee on Water Resources. Under this project, NRSC, by utilising remote sensing techniques, was to provide information on irrigated area, major crops, water logging, salt affected soils etc., for three crop seasons with attendant maps in 14 selected Command Area Development Projects (CADPs). NRSC was also to conduct end-of-study workshops in the five[35] participating states.

[35] West Bengal, Andhra Pradesh, Rajasthan, Assam and Maharashtra.

NRSC completed the study in September 2001 after a delay of nearly two years. Further, the end-of-study workshops were held only after a lapse of three years i.e., between November 2004 and March 2005. It was opined in these workshops that the data of 1985-86 to 1997-98 studied and interpreted by NRSC would not be useful in planning of irrigation schemes after 2005. Thus, delay in conducting workshop and completion of the project not only impacted implementation of remedial measures in the existing command areas but also affected the planning for future irrigation projects in command area, post 2005.

In September 2008, NRSC attributed the delay in conducting the end-of-study workshop and dissemination of data to the participating states to lack of communication from CADPs. DOS stated in July 2009 that the implementation of remote sensing application projects was the primary responsibility of the Ministry concerned.

The replies of NRSC and DOS need to be viewed in the light of the fact that NRSC was responsible for coordination with authorities of CADP as a Member Secretary of the Standing Committee of NNRMS on Water Resources which did not meet even once during April 2003 to March 2005. This indicated that NRSC did not coordinate effectively with authorities of CADP leading to delays in holding of workshops and consequent wastage of resources as the data collected and archived by NRSC could not be used in planning irrigation schemes beyond 2005.

National Wasteland Mapping

6.2.2 Ministry of Rural Development entrusted NRSC to map the wasteland inventory using satellite remote sensing on large scale in 1986. While the scheduled date of completion of this task was not borne on the records of NRSC, it actually completed this task and released the maps only in 2000 i.e., after 14 years.

During 1980 to 2003, against the targeted objective of rehabilitation of 63.85 million hectares set by the National Wasteland Development Board, only 8.58 million hectares (13.44 *per cent*) of wasteland could be rehabilitated. The delay in completion of the wasteland mapping mission contributed to the non-achievement of the target for rehabilitation of wasteland.

Ministry of Rural Development entrusted another NNRMS project in 2003 for updating details of wastelands at an estimated cost of ₹ 4.98 crore. The wasteland mapping projects were coordinated by the Standing Committee of NNRMS on Rural Development. This project was completed in March 2005. We also observed that though impact assessment of reclamation activities was one of the objectives of this project, the same was not carried out by NRSC. As a result, the impact of reclamation activities undertaken could not be assessed. Further, the Standing Committee of NNRMS on Rural Development did not meet even once during April 2003 to March 2005 to coordinate these activities.

DOS replied in July 2009 that impact assessment was not carried out as Ministry of Rural Development did not furnish necessary inputs such as data on villages, their location and spatial extent which were funded under wasteland development programmes. The reply of DOS is to be viewed in light of the fact that DOS was the nodal agency and NRSC as a member of the Standing Committee of NNRMS on Rural Development, could have ensured proper coordination with the Ministry of Rural Development for getting the necessary inputs required for making impact assessment.

Thus, inadequate coordination with Ministry of Rural Development through the mechanism of NNRMS Standing Committees contributed to non-reclamation of 86.56 *per cent* of the targeted wasteland. Also, the impact assessment of the completed reclamation activities was not done.

Rajiv Gandhi National Drinking Water Mission

6.2.3 Under the Mission, Ministry of Rural Areas and Employment[36] in December 1998 entrusted NRSC, the work of preparation of geo-morphological[37] maps utilising satellite data for identification of sources of drinking water for all the 'non-covered' and 'partially covered' habitats by the year 2000. The project was coordinated by NNRMS Standing Committee for Rural Development.

We observed that NRSC could complete the work only in 10 states[38] by November 2005. In the remaining 17 states, NRSC planned to complete the ground water survey work of 10 states by the end of June 2010 and in the balance seven states, work was yet to be taken up. Considering the fact that this project had immense success[39] in seven states, there was need to expeditiously complete the work in the remaining 17 states.

We also observed that during the period from April 2003 to November 2008, the Standing Committee of NNRMS for Rural Development, which was mandated to coordinate activities under this project, met only once in February 2006. Thus, lack of coordination resulted in non-achievement of the objective of identification of sources of drinking water in all states.

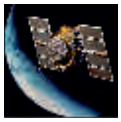
DOS stated in July 2009 that it made efforts in NNRMS meetings to cover the entire country in a phased manner. Reply of DOS has to be viewed in the background of the recommendations made by the Parliament Standing Committee of DOS in May 2003 that DOS should extend the coverage to all states by closely coordinating with the states.

[36] Now Ministry of Rural Development (MoRD).

[37] Maps prepared after the study of physical features of the surface of the earth and their relation to its geological structures.

[38] Andhra Pradesh, Karnataka, Kerala, Chattisgarh, Madhya Pradesh, Rajasthan, Jharkhand, Gujarat, Himachal Pradesh and Orissa.

[39] 90 *per cent* of the identified drinking water sources could yield water by digging wells.



Village Resources Centre

6.2.4 The aim of Village Resources Centres (VRC) was to make satellite based services[40] directly accessible to the rural population. A Programme Management Board at NNRMS controls and coordinates activities under this programme. The activities under VRC Programme of NNRMS were being implemented through nine regional coordinators[41].

The regional coordinators identify and engage NGOs to run expert centres[42] and VRC nodes[43]. NRSC was designated as the regional coordinator for the VRC activities in Andhra Pradesh and Orissa region. The regional nodes of NRSC in these states became operational from September 2007.

We reviewed the performance of NRSC (regional coordinator in the states Andhra Pradesh and Orissa) covering the period from October 2007 to August 2008 in terms of slots used by expert centres and utilisation of VRC nodes and observed that:

- Against the target of setting up 40 and 47 VRC nodes in the states of Andhra Pradesh and Orissa, only 34 and 40 nodes were set up.
- Expert centres were utilising only 51 *per cent* of allocated slots for programmes resulting in non-utilisation of available slots.
- VRC nodes participating in programmes were only 13 *per cent* on an average resulting in idling of VRC nodes.

NRSC stated in September 2008 that its team was continuing its efforts to further improve the utilisation rate. Thus the aim of making satellite based services directly accessible to the rural population through VRCs remained largely unachieved.

Disaster Management Support Programme (DMSP)

6.2.5 For procurement of a dedicated aircraft for disaster survey, all weather monitoring and high resolution terrain mapping, ISRO released a sum of ₹ 65 crore to NRSC in March 2006.

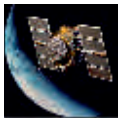
We observed that on account of delays in analysis of tenders received, non-availability of technical experts for Technical Evaluation Committee, etc., the aircraft was not procured even as of January 2009.

[40] Services like education, healthcare, weather, land & water resource management, mitigation of impact of natural disasters etc.

[41] Regional coordinators are (i) Space Application Centre, Ahmedabad (ii) NRSC, Hyderabad (iii) Indian Institute of Remote Sensing, Dehradun (iv) Regional Remote Sensing Centre (RRSC), Bangalore (v) RRSC, Dehradun (vi) RRSC, Jodhpur (vii) RRSC, Kharagpur (viii) RRSC, Nagpur and (ix) North East Space Application Centre, Shillong.

[42] Expert centres are Non Government Organisations (NGOs) appointed by regional coordinators to run programme for VRCs.

[43] VRC node is a node available at the village where the villagers can go and watch the interactive programme telecast by the expert centers in their respective allotted slots.



DOS replied in July 2009 that the process of arriving at the specification and mission profile as well as evaluation of proposals and gap analysis was complex involving several experts across different organisations. Reply of DOS pointed to the fact that DOS released funds knowing fully well that the process of procurement of aircraft would take considerable time and this allowed the funds to remain blocked.

Further, for operationalisation of Aerial Large Terrain Mapping and digital camera, ISRO had released a sum of ₹ 29.70 crore in installments over a period of five years (2003-08). NRSC could spend only ₹ 7.80 crore as of March 2008 and project implementation was slow.

NRSC and DOS attributed the delay in the project implementation to:

- delay in obtaining clearance for the instrument and its products from the Ministry of Defence,
- delay in obtaining clearances for procurement from the Government of the United States of America, and
- non-availability of pilots.

The replies of NRSC/DOS regarding non-availability of pilots needs to be viewed in the light of the fact that NRSC had not been able to procure a dedicated aircraft and the services of pilots, even if hired, would not have been utilised. The fact remained that 92 *per cent* of the funds amounting to ₹ 86.90 crores released to NRSC for the above programme as well as assets worth ₹ 7.80 crore remained unutilised with NRSC.

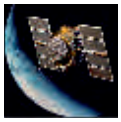
Operational Projects for ACL

6.3 NRSC also undertook projects on behalf of ACL, the commercial arm of DOS, towards establishment/upgradation of ground station facility of ACL. DOS issued guidelines in June 2001 underlining the procedure to be followed by DOS/ISRO units for the works undertaken by them on behalf of ACL. We reviewed seven out of ten projects undertaken during the period by NRSC on behalf of ACL and our observations are as under:

Costing of projects

6.3.1 In four[44] out of seven projects, chargeable overheads were not levied resulting in under-costing of these projects by ₹ 83.43 lakh.

[44] The projects were International Ground Station data products system development Project for Cartosat 1&2 for ACL (Project Code 1154), International Ground Station data products system development Project for Other Satellites for ACL (Project Code 1104), Project on up-gradation of existing data reception stations for ACL (Project Code 1246) and setting up of a separate facility for processing and worldwide marketing of data acquired at Svalbard, Norway (Project Code 1239).



NRSC stated in October 2008 that three of these projects were funded from the revenue share received from ACL. Further, DOS stated in July 2009 that concession was allowed to a project of Defence Department. Reply of NRSC is not acceptable, since the guidelines issued by DOS in June 2001 did not provide for utilising revenue received from ACL towards projects executed for ACL. The reply of DOS is also not acceptable as the costing policy of NRSC did not permit any specific concessions to Defence Department.

Dues from ACL

6.3.2 In two[45] completed projects, NRSC did not raise demand for balance dues of ₹ 1.85 crore[46] from ACL. On this being pointed out, NRSC/DOS stated in September 2008/July 2009 that demands were since raised. However, details of realisation of dues were not furnished. This also resulted in loss of potential interest of ₹ 48.15 lakh[47] at eight *per cent* per annum, up to March 2009.

Other operational projects

6.4 NRSC undertook operational projects for various users for delivery of maps and processed remote sensing data for urban planning, mining, water resources, impact evaluation of development programmes, etc. We test checked 60 such user projects and our observations are given below:

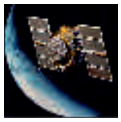
Delays in completion

6.4.1 In operational projects, NRSC was to provide value added services based on user requirements such as data for urban planning, infrastructure planning, implementation of social sector programmes, impact evaluation of programmes under food, water, environment security, watershed management, disaster management etc. While timely completion of these projects reflected the efficiency level of NRSC, delays impacted programme implementation adversely. In 21 out of 60 user projects test checked, completion was delayed by eight to 54 months impacting the effective utilisation of various resources at NRSC. The delays were attributable to various bottlenecks such as delay in obtaining statutory clearances, changes made by users, delays in obtaining field data etc. The details are furnished in **Annex-4**. Many of these delays could have been avoided with better coordination, effective follow up and timely addressing the cause of bottlenecks.

[45] Project on up-gradation of existing data reception stations for ACL (Project Code 1246) and setting up of a separate facility for processing and worldwide marketing of data acquired at Svalbard, Norway (Project Code 1239).

[46] In the first project, ₹ 77.52 lakh (Out of balance ₹ 1.75 crore receivable, ACL procured servers worth ₹ 97.48 lakh for the facility, hence balance receivable was ₹ 77.52 lakh) was due in March 2006 from ACL. In the second project, ₹ 1.08 crore was receivable.

[47] In the first project ₹ 77.52 lakh was outstanding for three years resulting in loss of interest of ₹ 8.60 lakh and in second project ₹ 1.08 crore was outstanding for 3.42 years resulting in loss interest of ₹ 29.55 lakh as of March 2009.



Outstanding dues

6.4.2 As of March 2008, a total sum of ₹ 6.64 crore was outstanding in 60 test checked projects. We observed that the oldest of these cases related to 1993-94 and major defaulters were agencies of Central and State Governments. We also observed that this was mainly due to relaxing the quantum of payments on delivery.

DOS stated in July 2009 that outstanding dues were reduced to ₹ 4.94 crore. DOS further replied in December 2009 that terms of payment were relaxed based on the users request due to their budget constraints. Reply of DOS has to be viewed in the background of the fact that these were user projects undertaken based on an MoU and not Government projects and users in these cases were agencies of State and Central Governments where accounts were maintained on commercial basis.

Wasteful expenditure

6.4.3 Water Resources Development Organisation (WRDO), Karnataka in September 2003 entered into an agreement with NRSC for supply of digital thematic/ topographical maps, estimate availability of water in specified river basin and preparation of project report at an estimated cost of ₹ 15.49 crore. The agreement provided for the relaxed payment terms as against the prescribed payment terms of 90 *per cent* as advance and 10 *per cent* on completion of project. The project was to be completed in 12 months.

We observed that despite relaxed terms of payment of ₹ 3.10 crore on signing of agreement (20 *per cent*) and remaining on achieving the prescribed milestone, the work was started without receiving the signing amount. Only an amount of ₹ 2.57 crore was received in two installments.

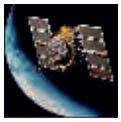
On the other hand, NRSC could not obtain necessary inputs from WRDO and the project was kept in abeyance from December 2005 after incurring expenditure of ₹ 4.64 crore and entered into avoidable litigation with the firm to which the part of work was outsourced. Thus, the expenditure of ₹ 4.64 crore did not serve the intended purpose and ₹ 2.07 crore (₹ 4.64 crore – ₹ 2.57 crore) remained unrecovered from WRDO.

Blocking of public funds

6.4.4 Our review of balances available under Government projects implemented by NRSC disclosed that an aggregate sum of ₹ 75.14 crore remained unutilised in 46 projects. Non-utilisation had resulted in blocking of Government funds. Out of these 46 projects, 34 projects were NNRMS projects (₹ 74.66 crore). The blockage ranged from one year to more than five years[48]. These instances of blocking were in violation of Rules 209 (3)[49]

[48] One year for eight projects involving ₹ 3.31 crore; two years for six projects involving ₹ 67.54 crore; three years for 18 projects involving ₹ 3.36 crore and five years & above for 14 projects involving ₹ 0.93 crore.

[49] Rule 209(3) states that award of grants should be considered only on the basis of viable and specific schemes drawn up in sufficient detail by the Institution or Organisation. The budget for such schemes should disclose, inter alia, the specific quantified and qualitative targets likely to be attained against the outlay.



and 209 (5)[50] of General Financial Rules (GFRs) and indicative of inadequate monitoring of utilisation of funds, delay in project implementation etc.

DOS replied that audit observation was noted.

Undercosting of projects

6.4.5 We observed that there was undercosting of ₹ 2.52 crore in 12 out of 60 user projects test checked. The undercosting was due to undercharging of overheads (10 cases involving ₹ 1.95 crore) and undercharging of rates for certain services (two cases involving ₹ 0.57 crore). The details are furnished in **Annex-5**.

While NRSC stated in November 2008 that these projects were for Government Departments/ Organisations, DOS stated in July 2009 that overheads were reduced on case to case basis depending on criticality, scale etc. The reply of NRSC/DOS has to be viewed in the light of the fact that reduction of overheads on a case to case basis was not in conformity with their costing policy.

Projects without MoU

6.4.6 NRSC took up a project for aerial photography related deliverables of seven districts of Madhya Pradesh for M/s Air Survey Company of India Private Limited, Kolkata in April 2001. Though all the deliverables were supplied by March 2002, ₹ 83.43 lakh being the amount due from the user was not received. In another project for Bruhat Bangalore Mahanagara Palike, though this task was completed by November 2006, NRSC did not receive the payment of ₹ 27.99 lakh. We observed that in these two projects, NRSC completed the work without signing MoU as required thereby rendering recovery of dues of ₹ 1.11 crore difficult.

Conclusion

The participation of NRSC in the completion of projects of national importance with other implementing agencies was inadequate in as much as NRSC, as a member/members secretary of NNRMS, did not adequately coordinate these projects that were aimed at achieving vital social objectives in the areas of food security, water security, urban planning etc.

In projects undertaken on behalf of ACL, there were instances of relaxation of terms of payment, short realisation of revenue etc. In operational projects, there were deficiencies in planning and implementation, non/partial achievement of the objectives, delays in completion of projects etc.

[50] Rule 209 (5) states that every order sanctioning a grant shall indicate whether it is recurring or non-recurring and specify clearly the object for which it is being given and the general and special conditions, if any, attached to the grant. In the case of non-recurring grants for specified object, the order shall also specify the time limit within which the grant or each installment of it, is to be spent.

Our Recommendations	Action proposed by NRSC on recommendations
8. NRSC/DOS, as an exclusive agency to provide remote sensing services, may associate themselves more closely with the planning and implementation of projects of national importance and of NNMRS where remote sensing techniques are used to ensure realisation of expected benefits on time.	*NRSC assured in February 2010 that efforts would be made through various NNRMS Standing Committees to impress upon the respective ministries to utilise the remote sensing technology in planning and implementation of projects. Efforts would also be made to ensure that the Standing Committees meet more often with enhanced participation. It added that with the planned Space-based Information Support for Decentralised Planning Project launched recently by PC-NNRMS, NRSC would work very closely with the concerned State Governments to reach the satellite based information to the local bodies in a more effective and coordinated manner. It further stated that for the timely realisation of applications and implementation of various projects of national importance, efforts would be made to adhere to time schedules, enhance utilisation of content and information so that benefits become far reaching.*
9. NRSC/DOS may enter into appropriate MoU with Antrix Corporation Limited and collect all receivables from them. It should also enforce conditions of MoU with other government and private users to avoid overdues, undercosting etc.	*Indicating that all outstanding dues had since been recovered from ACL, NRSC pointed out in February 2010 that it was in the process of entering into a MoU with ACL. It added that a mechanism for entering into an MoU with project sponsoring agencies had since been institutionalized and it would ensure that all the conditions of MoU (inclusive of financial terms) were adhered to.*

Chapter 7 Training in Remote Sensing

Audit Objective 5: To assess whether adequate training on remote sensing was imparted to ensure effective usage of data products.

Indian Institute of Remote Sensing, Dehradun

7.1 Indian Institute of Remote Sensing (IIRS), Dehradun, a unit of NRSC, is the focal point for long and short-term courses and refresher courses for training in remote sensing. It conducts customised courses for professionals, for the period ranging from four days to 24 months. The main function of IIRS is capacity building through education at post-graduate level in the application of remote sensing and geo-informatics for natural resource management. In addition to the training at IIRS, NRSC at Hyderabad campus provides short term training to the users of data products, as a part of its promotional activities.

The users of remotely sensed data require technical expertise to utilise the same for their applications. Therefore, training and continued customer support is an integral part of the remote sensing data utilisation programme. To meet this, NRSC provides capacity building in remote sensing through education and also provides short term training to data users. In the area of capacity building, we observed that there were shortages in planned enrollment due to stricter evaluation criteria. In short term training programmes, we observed that the involvement of private users in the programmes needed to be improved.

Enrolment at IIRS

7.2 The various courses offered by IIRS include:

- Masters in Technology (M.Tech)course of 24 months duration in Remote Sensing & GIS Natural Resource Management (Mapping & Monitoring),

- Two Masters in Science (M.Sc) courses in Geo-informatics and Geo-hazards of 18 months duration each,
- Eight/nine Post Graduate Diploma courses of 10 months duration,
- Eight certificate courses of four months duration in various disciplines of remote sensing applications,
- Post Graduate courses of 9 months duration for Centre for Space Science and Technology Education (CSSTE) in Asia Pacific region,
- Special courses at the request of the users, and
- Various short term courses of duration ranging from 4 days to 8 weeks.

The details of number of participants planned/enrolled and percentage not enrolled in these courses are detailed in **Annex-6**.

7.3 With regard to the enrollment of students in various courses conducted by IIRS, we observed that:

- The total number of students enrolled in all courses during 2003-04 to 2008-09 showed an increasing trend wherein the number of students increased from 249 in 2003-04 to 522 in 2008-09. The increase in number of students was mainly due to increased number of students in short term courses.
- Though courses were conducted as planned, there were shortages in number of participants by 10 to 35 *per cent* during 2003-04 to 2008-09 for M.Sc courses.
- In Post Graduate Diploma courses, the shortages in enrollment were 16 to 59 *per cent* during 2003-09
- In Certificate Courses, the shortages in enrollment were 24 to 76 *per cent* during 2003-09.
- In CSSTE courses, the shortfall in enrollment was 5, 10 and 25 *per cent* during 2005-06, 2007-08 and 2008-09.

While the increase in the overall enrollment would go a long way in enhancing capacity building in the area of remote sensing, there is a need to ensure that the slots allocated for various long term courses like M.Sc, M.Tech and Post Graduate Diploma do not remain unutilised.

DOS replied in July 2009 that there were large numbers of applicants for M.Sc. programmes and that these programmes had eligibility criteria and strict evaluation system and hence the slots remained unutilised.

Training at Hyderabad Campus

7.4 The Standing Committee of Parliament on DOS recommended that more and more private entrepreneurs should be associated in the process of remote sensing data utilisation programme. NRSC, at its Hyderabad campus, conducted three to eight short term courses of 16 to 26 weeks duration for 85

to 180 participants during the period under review. These courses were planned for promoting the sale of data products. The details of such courses conducted are given in **Table 8**.

Table 8
Courses conducted at NRSC, Hyderabad during 2003-08

Year	Course Type		Total Courses	Number of Participants from			Total Participants
	Regular	Customised		Government	Private	Academic	
2003-04	4	0	4	46	15	24	85
2004-05	4	1	5	77	31	30	138
2005-06	3	0	3	45	18	23	86
2006-07	4	4	8	117	9	25	151
2007-08	5	3	8	128	20	32	180
Total	**20**	**8**	**28**	**413**	**93**	**134**	**640**

It could be seen from the above table that the percentage of private persons trained against total number of trainees was only 14.53 *per cent*[51].

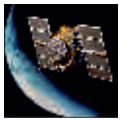
There is, therefore, a need to conduct more short term courses for promotional activities with enhanced participation of private persons keeping in view the fact that these short term courses would, in turn, promote sale of data products.

Conclusion

There was an overall increase in the number of students trained by the IIRS. However, there was shortfall in the enrolment in long term courses. Further, the number of private persons trained for promoting the sale of data products was lower than participants from the Government sector. As a result, the objective of promoting the sale of data products to more and more private entrepreneurs was not fully met.

Our Recommendations	Action proposed by NRSC on recommendations
10. NRSC may ensure planned level of enrolment in customised courses to fully utilise its training facilities. It should also encourage more private participants in its short-term courses, which would encourage sale of its data products to them.	*Agreeing that it would make all efforts to comply with the recommendations, NRSC stated in February 2010 that it planned to advertise more widely the details about the short-term courses. NRSC would also ensure that more private participants were encouraged to attend the short term courses as well as if needed, conduct specific customised courses for them.*

[51] 93x100/640 = 14.53 *per cent*.



Chapter 8 Financial Management

Audit Objective 6: To assess whether the financial management was effective in aiding NRSC in carrying out its mandated activities.

8.1 Sound financial management ensures efficient use of financial resources, avoids blocking of public funds and promotes execution of the activities as planned. Instances of release of grants without assessing the requirements of NRSC thereby blocking of public funds with NRSC, inadequacies in planning process in view of wide variations in budget and actuals under various heads etc., were noticed which are discussed in the succeeding paragraphs.

8.2 The working results of NRSC for the year from 2003-04 to 2007-08 are given in **Table 9**:

Table 9
Working results of NRSC during 2003-08[52]

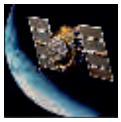
(Amount: ₹ in crore)

No	Description	2003-04	2004-05	2005-06	2006-07	2007-08
1	Income from services	57.94	65.20	66.89	76.33	76.72
2	Income from interest	1.82	11.65	7.75	30.50	29.71
3	Other Miscellaneous Income	4.36	6.30	12.27	5.87	4.11
4	**Total Income (1 to 3)**	**64.12**	**83.15**	**86.91**	**112.70**	**110.54**
5	Personnel & General Expenses	35.88	39.23	47.30	49.74	50.27
6	Operational expenses	33.80	34.25	31.81	39.05	24.23
7	Other Expenses	6.10	1.15	2.13	4.24	46.34
8	**Total Expenditure (5 to 8)**	**75.78**	**74.63**	**81.24**	**93.03**	**120.84**
9	**Surplus/ Deficit (-)**	**-11.66**	**8.52**	**5.67**	**19.67**	**-10.30**

It can be seen from the Table 9 above that:

- The income from services which mainly consisted of sale of data products increased from ₹ 57.94 crore in 2003-04 to ₹ 76.72 crore in 2007-08 indicating annual compounded growth of just 7.27 *per cent*. The growth of 7.27 *per cent* was achieved despite launch of three new satellites from October 2003 to March 2008. As against this, expenditure of NRSC increased from ₹ 75.78 crore in 2003-04 to ₹ 120.84 crore in 2007-08 indicating annual compounded growth of 12.37 *per cent*.
- Inspite of accounting for interest income of ₹ 81.43 crore during 2003-08, NRSC could manage an overall surplus of only ₹ 11.90 crore. The interest income alone contributed 17.81 *per cent* of total income.
- The working results deteriorated during the year 2007-08 and showed deficit of ₹ 10.30 crore, while expenditure rose by 29.89 *per cent* over the previous year.

[52] As NRSC became a Government entity from 1 September 2008, figures up to 2007-08 was considered.



Excessive release of Grants

8.3 According to Rule 208 and 209 GFR 2005, if financial assistance is proposed to be granted to an organisation, the feasibility of giving such assistance as grant-in-aid should be specifically considered by sanctioning authority in consultation with Ministry of Finance. The guidelines on expenditure management including fiscal prudence and austerity were issued in September 2004. The guidelines drew attention on the cases in which substantial unutilised balance available with bodies were kept as deposits with the Banks. Ministries were advised not to release grants in such cases.

The cash flow statement of NRSC during 2003-08 is detailed in the **Table 10**.

Table 10
Cash Flow Statement of NRSC during 2003-08

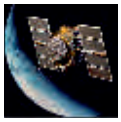
(Amount: ₹ in crore)

No	Description	2003-04	2004-05	2005-06	2006-07	2007-08
1	Opening Cash/ Bank Balances	90.04	98.77	163.86	225.72	372.26
2	Cash flow from Grants (General purpose)	9.00	14.00	14.00	20.00	10.54
3	Cash flow from Special Projects grants of DOS	23.23	25.14	29.29	36.87	13.25
4	Cash flow from advances for special projects of DOS	1.78	35.57	31.53	87.98	5.38
5	Surplus from operations	0	8.52	5.67	19.67	0
6	**Total Cash Flow (1 to 5)**	**124.05**	**182.00**	**244.35**	**390.24**	**401.43**
7	Cash out flow for Assets	13.62	18.14	18.63	17.98	17.20
8	Cash out flow for deficit from operations	11.66	0	0	0	10.30
9	**Total Cash out flow (7 to 8)**	**25.28**	**18.14**	**18.63**	**17.98**	**27.50**
10	**Net Cash and Bank Balance at the close**	**98.77**	**163.86**	**225.72**	**372.26**	**373.93**

It could be seen from the table above that NRSC had an opening balance of ₹ 90.04 crore at the beginning of the year 2003-04 which had increased to ₹ 373.93 crore at the end of 2007-08 due to accumulation of unspent balances. NRSC incurred overall surplus of ₹ 11.90 crore during 2003-08 against which a general purpose grant of ₹ 67.54 crore[53] was received. Instead of refunding these unspent balances, NRSC deposited these substantial balances available with them in bank accounts and earned interest of ₹ 81.43 crore.

NRSC replied in November 2008 that as income from services was dependent on operational conditions like climatic and financial conditions prevalent in the country and bound for wide fluctuations, grant-in-aid on continuous basis assumed significance and became reasonable and justifiable. Reply is to be viewed in the context of the aforesaid provisions contained in GFRs.

[53] Grants released during the period 2003-04 to 2007-08 were ₹ 9 crore, ₹ 14 crore, ₹ 14 crore, ₹ 20 crore and ₹ 10.54 crore.



DOS, without furnishing details, replied that major part of opening balance during any financial year consisted of the advance payments made by users for the projects. The fact remains that ₹ 75.14 crore (in 46 projects) was blocked due to non-utilisation of balances.

Budgeting and Budgetary Control

8.4 Budget estimates and actuals of NRSC for 2003-04 to 2008-09 under major heads of accounts along with variations are given in **Annex-7**. It could be seen that:

- NRSC earned its major revenues from its services such as sale of data products and overheads from its aerial and satellite application projects. Revenue earned by NRSC varied between (+) 17 *per cent* to (-) 29.84 *per cent* against its estimation during 2003-09 indicating deficiencies in planning of its resources.
- The expenditure of the NRSC center varied between (+) 20 *per cent* and (-) 30 *per cent* against its estimation during 2003-09 indicating deficiencies in planning and monitoring its activities.
- The variable expenditure incurred by NRSC varied between (-) 42 *per cent* and (+) 58 *per cent* against its estimation during 2003-09 indicating deficiencies in planning and expenditure control.
- The variation was due to delay in completion of programmes/ projects executed by NRSC and slow progress/ non-utilisation of funds under NNRMS projects as detailed in Chapter 6 of this report.

These significant variations were indicative of deficiencies in budgeting of revenue and expenditure control.

NRSC in November 2008 and DOS in July 2009 replied that though financial planning was made in the relevant financial year, due to operational constraints, the works spilled over to next year. In such cases, the expenditure planned would not materialise during the relevant financial year itself. It was also replied that variation in the income generation was also due to operational constraints. Reply of NRSC points to that fact that NRSC/DOS needed to exercise better monitoring and control over operational activities so as to complete these projects in accordance with planned targets.

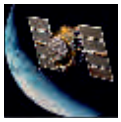
Commission charges to ACL

8.5 NRSC sold remote sensing satellite data to foreign clients through ACL. No MoU or agreement existed between NRSC and ACL laying down specific responsibilities for:

(i) monitoring, billing and collection of dues;

(ii) accounting for revenues and expenses incurred in respect of these contracts and working out actual revenue to be paid to NRSC; and

(iii) providing appropriate marketing services.



The pricing sub-committee of NRSC had fixed (January 2008) the revenue share between NRSC and ACL in the ratio of 50:50 for the sale of IRS data to foreign clients.

We observed that though it had the monetary implication of more than ₹ 1 crore, there was no approval of the Member (Finance) of Space Commission for this arrangement which was necessary in cases where the value of the transaction exceeded ₹ 1 crore. We also observed that with this arrangement, NRSC was realising the revenue of the international sales at the domestic rates for all its international sales.

We further observed that according to an internal note (January 2008) of NRSC, the revenue share between NRSC and ACL for the supply of IRS data to foreign clients was fixed at 35 *per cent*, the remaining 15 *per cent* being re-seller's commission. For similar services[54], DOS was paying to ACL an agency commission of 15 to 20 *per cent*. Thus, NRSC was paying additional commission charges of 15 to 20 *per cent* to ACL and this resulted in reduction of NRSC revenue in the range of ₹ 1.44 crore[55] to ₹ 1.92 crore[56] during 2004-05 to 2007-08.

Noting our observations, DOS replied in July 2009 that NRSC would enter into MoU with ACL on the revenue sharing mechanism. DOS justified the higher percentage of commission to ACL by stating that the efforts required to be put in by ACL for sale of remote sensing data products of IRS satellites were higher as compared to the efforts required for leasing of transponders.

Reply of DOS is not acceptable since ACL sells the satellite data products to its international customers through its re-seller (M/s Space Imagery) by paying the sub agent commission of 15 *per cent*. Therefore, there was no additional effort on the part of ACL for getting 35 *per cent* commission.

Delay in remittance of revenue by ACL

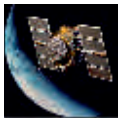
8.6 According to the Receipt and Payment Rules (Rule 6), all government receipts should be paid in full for inclusion in Government accounts. In contravention of these provisions, we observed that ACL was allowed to deduct its commission charges from the revenues collected prior to remitting the same to NRSC. Payment of commission charges was also not included in the budget of NRSC and this resulted in lack of transparency in the disclosure of receipts of NRSC and payment of commission charges by them to ACL.

We further observed that though data were supplied from 2004-05 onwards; agency commission payable to ACL was decided as late as in January 2008.

[54] INSAT revenue generated from two segments (i) from leasing of transponders for television operations and (ii) leasing of transponders for VSAT operations.

[55] 15 *per cent* of ₹ 9.62 crore.

[56] 20 *per cent* of ₹ 9.62 crore.



NRSC neither raised invoices for the services rendered to foreign clients through ACL nor did it treat the revenue receivable as sundry debtors (data products) in the accounts of NRSC up to January 2008.

Against an amount of ₹ 4.81 crore payable by ACL for 2004-05 to 2007-08, ₹ 2 crore was paid in March 2008 and an amount of ₹ 2.81 crore was yet to be received as of August 2008. The inordinate delay in deciding the revenue share had also resulted in loss of interest of ₹ 48.40 lakh to NRSC calculated at eight *per cent* per annum.

DOS stated that the outstanding amount due from ACL was ₹ 93 lakh as of July 2009 and efforts were being made to recover the outstanding amount.

Dues from the sale of satellite data

8.7 Terms of payment of NRSC Data Centre (NDC) required that satellite data products should be disseminated on receipt of 100 *per cent* advance payment. We, however, observed that NRSC was selling data products on credit basis to both Government and private users. NRSC did not furnish year wise information on outstanding dues and the dates from which the dues were outstanding.

The available status of amount receivable on the sale of data products to various categories of users up to March 2008 (as of July 2008) is detailed in **Table 11**.

Table 11
Outstanding dues from the sale of satellite data

(Amount: ₹ in crore)

No	Description	No	Amount
1	Department of Space and its units	36	3.81
2	Other Government users including research institutes, academicia including colleges and universities	54	0.20
3	Private users	48	2.60
4	Not known	7	0.43
	Total	**145**	**7.04**

From the above table, it can be seen that the outstanding dues (₹ 7.04 crore) were 14.68 *per cent*[57] in terms of sale of data products. In this regard we also observed that:

- ₹ 3.72 crore, to be collected from 120 clients, was outstanding for more than one year.
- Data products worth ₹ 64.14 lakh were supplied during 2007-08 to three clients[58] when ₹ 81.23 lakh was already outstanding from them.

[57] ₹ 7.04/47.95 crore.

[58] ACL, Anna University, Space Imaging in North America.

- ₹ 45.56 lakh was outstanding from eight users whose details were not available with NRSC, making recovery almost impossible. This indicated weak internal controls.

Thus, non-adherence to the basic condition of not allowing credit sales for the sale of satellite data products resulted in avoidable outstanding dues.

NRSC replied in September 2008 that for exceptionally important national projects and disaster related data requirements, credit sales were entertained with the condition of replenishing of funds. The reply needs to be viewed in the context that besides dues from government users, ₹ 2.60 crore was also outstanding from 48 private users.

DOS replied in January 2010 that satellite data outstanding dues reduced to ₹ 3.93 crore (status as of November 2009) and that efforts were on to realise these outstanding dues. The positive efforts made by DOS to recover outstanding dues need to be sustained to ensure higher levels of recovery in the future.

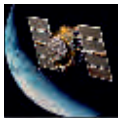
Adjustment of work centre advances

8.8 NRSC outsourced certain specified tasks of its application projects to Regional Remote Sensing Centres, State Remote Sensing Centre etc., for which advances were given to these agencies. These advances were to be adjusted on receipt of certificate of completion of task to be given by the Project Director and certificate of fund utilisation. In this regard we observed the following.

User projects: We observed that in eight user projects (83 instances), a total sum of ₹ 4.17 crore was outstanding and pending adjustment as of March 2008. Of this, ₹ 1.79 crore was outstanding for more than four years, the oldest being from 1999. The outstanding advances of ₹ 3.83 crore pertained to six completed projects. In one case (Rajiv Gandhi National Drinking Water Mission), even details to whom the advances (₹ 1.12 lakh) were released during 1999-2000 were not on record.

Government projects: An amount of ₹ 13.63 crore was outstanding in 140 cases of advances for settlement in 29 Government projects. Of this, ₹ 51.48 lakh was outstanding for more than five years and the oldest outstanding pertained to 1992. The outstanding advances of ₹ 50.48 lakh pertained to 11 completed projects.

While reporting subsequent adjustment of ₹ 10.71 crore, DOS stated in July 2009 that action was being initiated to get the outstanding adjusted in the shortest possible time.



Adequacy of Internal control and internal audit system

8.9 Internal control and internal audit are essential tools for good governance and are used as an aid in ascertaining compliance with rules and regulations, systems and procedures and instructions issued by the top management in accounting, financial and administrative matters. It ensures that the targets/goals/norms are fixed for various technical and operational parameters and also sees that such targets are achieved within the timeframe to obtain best value for money. Thus, internal control and internal audit ensures economic, efficient and effective implementation of various programmes/ activities/ schemes and projects.

Absence of regular and effective internal control was evident from the examination of records during this performance audit wherein we observed that the basic control issues were not addressed.

The issues that are detailed below indicated that internal controls were not commensurate with the requirement of NRSC and there was a need to strengthen the same.

- relaxation in terms of payment of the projects,
- outstanding dues to be collected from users, projects entered without MoU,
- non-adherence to costing policy,
- slow progress and non-utilisation of funds under NNRMS projects,
- unrealistic budgeting and inadequate budgetary control of NRSC programmes/activities,
- sales of data products to international customer through ACL remaining out of accounts,
- relaxation in terms of payment for the sale of data products, etc.,

Internal audit of NRSC was being conducted by the internal audit wing of the DOS. We observed that internal audit for 2007-08 and 2008-09 was yet to be taken up as of December 2009. We further observed that the scope of internal audit was mainly restricted to establishment matters and there was a need to strengthen the same by covering the appropriate operational issues, while improving the frequency of internal audit.

Conclusion

There were substantial unutilised balances available with NRSC under Government projects, despite which it continued to receive advances for special projects from DOS and from other government users. Budgeting of NRSC was not realistic indicating lack of control on income and expenditure and poor monitoring of projects. There was reduction of revenue/loss of interest due to irregular fixation/ delayed fixation of agency commission payable to ACL in the sale of satellite data. Internal control and internal audit were not commensurate with the requirement of NRSC and there was a need to strengthen the same.

Our Recommendations	Action proposed by NRSC on recommendations
11. The efficiency of financial management processes should be improved to achieve more realistic budgeting and control so as to avoid locking up public funds.	*NRSC noted the recommendation for compliance in February 2010.*
12. NRSC may streamline commission payable to ACL, avoid credit sales and streamline system for collection of receivables.	*NRSC stated in February 2010 that it was in the process of entering into a MoU with ACL Limited.*
13. Proactive action may be taken by NRSC to adjust outstanding advances paid to its work centres.	*NRSC agreed to ensure that all the conditions of MoU (inclusive of financial terms) were adhered to.*

New Delhi
Dated: 1 December, 2010

(RAJ G. VISWANATHAN)
Principal Director of Audit,
Scientific Departments

Countersigned

New Delhi
Dated: 1 December, 2010

(VINOD RAI)
Comptroller and Auditor General of India

Annex -1 Year wise acquisition of scenes by Indian remote sensing satellites

(Reference: Paragraph 3.2)

No	IRS (year of launch)	Data product generation capability	No. of scenes acquired								
			2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	Total	Maximum	Average per year
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1.	1 C (1995)	Not available	16471	15637	32749	48141	17184	500	130682	48141	21780
2.	1D (1997)	Not available	20241	16372	15704	32833	30735	17159	133044	32833	22174
3.	P 3 (1996)	7200	2270	15	0	0	0	0	2285	2270	2270
4.	P 4 Oceansat-1 (1999)	2880	1573	1690	1564	1758	962	950	8497	1758	1416
5.	P 6 Resourcesat-1 (2003)	108000	0	117045	103858	155787	162016	146918	685624	280908[55]	155119
6.	P 5 Cartosat-1 (2005)	72000	0	0	48329	111026	106021	109099	374475	111026	97520
7.	P 7 Cartosat-2 (2007)	7200	0	0	0	0	8690	24908	33598	52140[56]	28716

[55] Spacecraft was launched in October 2003 and acquired 117045 scenes for five months in 2003-04 from November 2003 to March 2004. Therefore, scenes acquired per annum would be 280908.

[56] Spacecraft was launched in January 2007 and acquired 8690 scenes for two months in 2003-04 from November 2003 to March 2004. Therefore, scenes acquired per annum would be 52140.

Annex -2 Idling of acquired Scenes

(Reference: Paragraph 3.6)

(Amount: ₹ in Lakh)

Year	IRS		MODIS		NOAA	
	Scenes Sold (Revenue realised)	Idling of scenes (Percentage)	Scenes Sold (Revenue realised)	Idling of scenes (Percentage)	Scenes Sold (Revenue realised)	Idling of scenes (Percentage)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2002-03	12414 (1255)	28141 (69)	65 (3)	1045 (94)	1510 (66)	3219 (68)
2003-04	13695 (1634)	137064 (91)	367 (21)	4043 (92)	817 (30)	4220 (84)
2004-05	15654 (2156)	186550 (92)	216 (12)	8826 (98)	775 (29)	7147 (90)
2005-06	16395 (2515)	333150 (95)	331 (17)	8458 (96)	383 (14)	8446 (96)
2006-07	24764 (3426)	300844 (92)	253 (12)	5960 (96)	443 (12)	12279 (97)
2007-08	34431 (3800)	265103 (89)	79 (2)	7919 (99)	467 (11)	15205 (97)
2008-09	38898 (4152)	43103 (53)	354 (N.A)	7288 (95)	293 (N.A)	6835 (96)
Total	**156251 (18938)**	**1293955 (89)**	**1655 (67)**	**43539 (96)**	**4688 (162)**	**57351 (92)**

Annex -3 Turn-around time during 2002-09

(Reference: Paragraph 3.7)

Turn - around time	2002	2003	2004	2005	2006	2007	2008	2009	Average
	Number of cases (*per cent*)								
Less than one day	2416 (15.9)	2599 (17.2)	2896 (15.7)	2477 (11.2)	2193 (10.6)	1718 (5.6)	693 (5)	7584 (9.7)	2822.00 11.36
One to seven days	8611 (55.9)	8895 (59)	11324 (61.3)	11932 (54.1)	9038 (43.8)	9968 (33.1)	4389 (31.5)	20775 (26.5)	10616.50 45.65
One week to two week	2486 (16.5)	2098 (13.9)	2786 (15.1)	4732 (21.5)	3734 (18.1)	7529 (24.6)	5490 (39.4)	24109 (30.7)	6620.50 22.48
Two week to one month	1185 (7.9)	1201 (8)	1104 (6)	255 (10.2)	2621 (12.7)	5239 (17.2)	2131 (15.3)	25253 (32.2)	4873.63 13.69
More than one month	449 (3.8)	291 (1.9)	345 (1.9)	2673 (3)	3075 (14.8)	5932 (19.5)	1211 (8.8)	715 (0.9)	1836.38 6.83
Total	**15147 (100)**	**15084 (100)**	**18455 (100)**	**22069 (100)**	**20661 (100)**	**30386 (100)**	**13914 (100)**	**78436 (100)**	**26769.00 (100)**

Annex -4 Time escalation in User Projects

(Reference: Paragraph 5.3 and 6.4.1)

Aerial Projects

Project code/ (Cost in lakh of ₹)	Project title [time escalation]	Remarks
1208 (66.19)	Large Scale Mapping of 11 towns of Andhra Pradesh Urban Services for Poor (APUSP) **[34 Months]**	The project commenced in May 2004 and was to be completed within nine months. The project was completed in December 2007, after a delay of 35 months. NRSC replied in September 2008 that the delay was due to non-receipt of payment from Andhra Pradesh Government and unfavourable weather conditions for carrying out ground control survey of a few towns. Reply is not acceptable, since the NRSC itself had relaxed the general terms of payment of collecting 90 *per cent* advance to three milestone installments of 30 *per cent* which resulted in non-receipt of payment and delay in completion of the project.
1120 (63)	Topographical survey for Godavari – Krishna Link Project **[40 Months]**	The project commenced in October 2001 for completion by October 2003. The project was actually completed in February 2007, after a delay of 40 months. NRSC and DOS replied in September 2008 and July 2009 that delay was due to delay in acquiring technology from United States of America, installation and commissioning and initial teething problems in LIDAR technology.
1059 (130.32)	Topographical survey for Godavari – Krishna Link Project **[54 Months]**	The project commenced in February 2001 for completion by August 2002. The project was actually completed in February 2007, after a delay of 54 months. The delay was due to the inordinate delay in procurement of Aerial Large Terrain Mapping system by NRSC for more than two years. As NRSC agreed to complete the survey in March 2003, it should have expedited the procurement process to complete the project in terms of the agreed schedule.
1155 (1549.4)	ALTM mapping for Garland command and Catchment area for WRDO. **[48 Months]**	The project commenced in September 2003 and the scheduled duration was up to August 2004. The project however, was pending since the user failed to furnish necessary inputs required for their progress. The user also did not extend the duration of the project. Hence it was kept in dormant state for the last four years. NRSC replied (September 2008) that WRDO could not finalise the yield, which was an important parameter for the design of the entire project. Due to this, area of the flying could not be decided.
1223 (65.77)	Aerial mapping for National Thermal Power Corporation (NTPC) over Loharinag **[25 Months]**	The project commenced in September 2004 was to be completed by November 2005. Aerial photographs were delivered by February 2007, but maps were delivered after obtaining clearance from Ministry of Defence in December 2007. NRSC in September 2008 and DOS in July 2009 replied that aerial photography was delayed due to other urgent tasks and unfavourable weather conditions. Subsequently, ground control survey was also got delayed due to natural hazards like landslides.

Project code/ (Cost in lakh of ₹)	Project title [time escalation]	Remarks
1222 (138.99)	Aerial mapping of Chhattisgarh **[20 Months]**	The project commenced in November 2004. The project was to be completed in November 2005. NRSC in September 2008 and DOS in July 2009 replied that ground control survey was aborted due naxal problem in the area. Finally, it was decided to proceed without ground control survey and the project was delayed in the process.
1185 (121)	Aerial photography and Mapping over Kolkata Municipal Corporation **[33 Months]**	An MOU was entered in December 2003 for ₹ 1.10 crore and scheduled duration of the project was one year. The cost of the project was also revised from ₹ 1.10 crore to ₹ 1.21 crore in February 2005. The MOU entered in December 2003 was not, however, amended to include the revision in the price. The work was finally completed in August 2007. There was inordinate delay in completion of the work. NRSC in September 2008 and DOS in July 2009 replied that during the course of project the user changed the specifications and ortho photos were requested additionally.
1183 (110.06)	Aerial photography of 16 places in Karnataka for KRSAC, Bangalore **[48 Months]**	The scheduled duration was up to May 2004. There was modification in the project and the user issued the modification order in May 2004. The project was, however, completed in all respects only in May 2008, when the data for towns were handed over. NRSC in September 2008 and DOS in July 2009 replied that project was delayed due unfavourable weather conditions and prolonged time taken for final classification of the data from Survey of India.
1153 (38)	Aerial triangulation & photo-grammetric mapping of Chennai **[8 months]**	Updation of photogrammetrically acquired data of Chennai was carried out by NRSC only in June 2004, whereas the scheduled date of completion of the project was in October 2003. NRSC in September 2008 and DOS in July 2009 replied that the project was delayed due to technical snag in the aircraft.
694 (843)	Aerial photo-graphy of 28 towns in India Phase II 13 towns **[8 months]**	Scheduled date of completion was December 2002. Aerial photography of 13 towns was completed only in August 2003. NRSC in September 2008 and DOS in July 2009 replied that execution of aerial photography and ground control survey over all the places were season dependent for conducive weather conditions.
1070 (1439)	Aerial photography of 28 towns in India Phase III 15 towns **[26 months]**	Scheduled date of completion of aerial photography was December 2002. The task was, however, completed for the remaining 15 towns of Phase III only in February 2005 i.e., after a delay of 26 months. NRSC in September 2008 and DOS in July 2009 replied that execution of aerial photography and ground control survey over all the places were season dependent for conducive weather conditions.

Project code/ (Cost in lakh of ₹)	Project title [time escalation]	Remarks
1240 (20)	Preparation of Base Maps for additional Shimla planning area **[13 months]**	In terms of the agreement the schedule for completion of the task was 11 months, i.e., before April 2006. NRSC submitted deliverables only in May 2007. NRSC in September 2008 and DOS in July 2009 replied that field data collection took additional time due to terrain undulations and inclement weather conditions generally prevailing in Shimla and its surrounding areas.

Satellite Projects

Project code/ (Cost in lakh of ₹)	Project title [time escalation]	Remarks
1061 (63.32)	Integrated land & water resources conservation using RS&GIS in Mandsuar, Ministry of Rural Development **[35 months]**	The project was sanctioned in March 2001 for completion by April 2002. The project was actually completed in March 2005, after a delay of three years. DOS replied in July 2009 that in an internal review it was decided to use hydro geo morphological maps and other base layers under preparation for this study area in order to optimise the efforts and resources. Thus deviation from the original scope of the work resulted in delay in completion of the project.
1217 (17.61)	Inventory and change detection study of surface water resources **[20 Months]**	The project was approved in November 2004 for eight months. Objective I was revised since cloud free data in the selected year were not available in khariff season. Objective II was dropped, Objective III and revised Objective I were completed by March 2007 whereas Objective IV was completed in December 2004 itself. NRSC replied in September 2008 that project was delayed due to delay in obtaining field data; other associated information and considerable time take to provide feedback and suggestions before preparation of report in March 2007.
1127 (498)	National Wasteland Mission (2003) **[12 Months]**	The 2003 mission was scheduled for completion by March 2004. The project was, however, delayed by one year, as the workload was high and the analysis was being carried out in digital environment in terms of administration boundaries. Escalation in project cost was not worked out due to this increased scope of work and workload. NRSC replied in September 2008 that the delay was on account of adopting the state of art technique, additional time taken by the centres to adjust to the new methods, changing priorities of the states, centres, hazards etc.
1264 (346.25)	National Wasteland Mission (2005) **[8 Months]**	The project was scheduled for completion in November 2007, was still ongoing (July 2008). Without indicating the present status of the project, NRSC replied in September 2008 that initially one season data was to be used. In order to improve the delineation, it was decided to use three season data.

Project code/ (Cost in lakh of ₹)	Project title [time escalation]	Remarks
1204 (14.20)	Ecological impact agreement of Khelgaon NTPC **[20 Months]**	In terms of letter of acceptance of August 2003, the work was to be completed in two years by July 2005. The final report, however, was submitted in March 2007. NRSC replied in September 2008 that project included NTPC component (Ambient air quality data). Because of some technical difficulties, NTPC provided data only in November 2006.
1063 (46.08)	Delineation of Season-wise cropped irrigated area **[9 months]**	The Government of India, Ministry of Water Resources entrusted Water & Power Consultancy Services (WAPCOS) to carry out a study on impact of irrigation system performance in closing gap in utilisation in two CAD canal commands. WAPCOS, in turn, engaged NRSC to undertake delineation of season-wise crop area and irrigated area in two commands. The total cost of the project was ₹ 46.08 lakh and the duration of the project was one year up to April 2002. NRSC, however, submitted the final report in January 2003. NRSC replied in September 2008 that the draft report was furnished in June 2002, but user department took considerable time to provide feedback and suggestions and the final report was submitted in January 2003.
1118 (346.27)	Integrated resource information system for desert area **[11 months]**	According to the sanction, the project was to be completed in July 2004. The project was, however, completed in June 2005. DOS replied in July 2009 that the delay was due to the delay in completing the soil theme data base in case of Gujarat. DOS also stated the project was extended by MoRD up to March 2005.
1252 (61.82)	Prioritisation of watershed using remote sensing and GIS techniques **[12 months]**	According to the sanction, the scheduled duration was up to November 2006. DOS replied in July 2009 that the final report was submitted in November 2007.
1201 (195.69)	Mapping in geo-database creation using high resolution satellite data for HUDA **[36 months]**	In terms of project proposal of March 2005 submitted to Hyderabad Urban Development Authority (HUDA) under Green Hyderabad Environmental Programme, the scheduled date of completion of the project was April 2006. DOS replied in July 2009 that HUDA had expressed their inability to supply the input required for the remaining component of the work worth ₹ 10 lakh and it was jointly decided to close the project in April 2009 and return the funds to HUDA.

Annex -5 Undercosting of User Projects

(Reference: Paragraph 6.4.5)

(Amount: ₹ in lakh)

Project Code	Chargeable amount	Charged amount	Under costing	Remarks
1255	697.50	675.90	21.60	NRSC entered into an agreement in December 2005 with Commissioner of Survey Settlement and Land Records, Government of Andhra Pradesh for aerial photography of Nizamabad district along with Kinematic Geo Positioning System data. We observed that as against the cost of ₹ 37,200 per kilometer decided in September 2005 towards aerial photography of urban areas on 1:40000 scale and generation ortho photos, NRSC actually charged ₹ 30,000 per kilometer only for 300 kilometers. This resulted in under charging of ₹ 21.60 lakh (300 x ₹ 7200). NRSC replied in August 2009 that Senior Project Coordination Committee (SPCC) reduced the overheads chargeable from 25 to 10 *per cent*. SPCC has powers to discount upto five *per cent* of the cost of the project. Wherever, any discount is awarded clear reasons should be recorded by the committee. Reasons were, however, not recorded by the committee.
1118	387.78	346.28	41.50	Ministry of Rural Development entrusted a project titled 'Integrated Resource Information System for desert areas' for the creation of natural resource database using satellite remote sensing technique to NRSC, in June 2002. The element of overheads included in the cost estimate was ₹ 26.62 lakh, against the leviable overheads of ₹ 68.12 lakh, resulting in under costing of ₹ 41.50 lakh. NRSC replied in November 2008 that overheads had been charged at the reduced rates as the users of the project were Government Departments/ Organisations. DOS also replied in July 2009 that when user funded project has a higher financial outlay and funded by Government organisation, a conscious approach has been practiced by NRSC to charge reduced rate of overhead on case-to-case basis. NRSC costing policy, however, did not provide for such reduction to Government Departments.
1105	69.55	47.64	21.91	Approved rates of ferry charges including abortive charges (provision to meet contingencies in the event of aborting aerial tasks) applicable, outstation allowances, idle day charges and parking charges were not charged.

Project Code	Chargeable amount	Charged amount	Under costing	Remarks
				NRSC in November 2008 and DOS in July 2009 replied that this was not a user project. The approved rates prevalent prior to before 2004 were charged. Reply is not acceptable, as the project code 1105 indicated that this was a user project and the approved abortive charges were not charged in any of these aerial tasks.
1136	172.89	138.00	34.89	Approved rates of ferry charges (including abortive charges applicable), outstation allowances, idle day charges and parking charges were not charged. NRSC replied in November 2008 that this was not a user project and that the rates charged were based on hourly-approved rates. Reply is not acceptable since the prices fixed by NRSC were not based on the costing policy. Besides, the project code 1136 indicated that was a user project. The approved abortive charges were not charged in any of these aerial tasks. DOS replied in July 2009 that abortive charges were not charged for aerial sorties. However, the approved rates of NRSC did not exclude aerial sorties from charging abortive charges.
1250	75.35	71.98	3.37	Against administrative overheads of ₹ 5.87 lakh being 25 *per cent* of total project cost of ₹ 23.48 lakh (excluding the cost of data products and training charges), NRSC charged only ₹ 2.5 lakh. NRSC replied in November 2008 that overheads were charged at 25 *per cent* of actual charges incurred by NRSC. Reply is not acceptable since under costing had been worked out after excluding data product charges and training charges of RSI, Canada and administrative overheads have been worked out on administrative cost. DOS replied in July 2009 that overheads were not charged on the cost of DOS/ NRSC training. However, the costing policy of NRSC did not exclude its training charges from administrative overheads.
1264	377.17	346.25	30.92	Overheads were charged only at 10 *per cent* of ₹ 206.10 lakh instead of 25 *per cent* at the request of MoRD. NRSC reiterated the position in its reply of November 2008. DOS replied in July 2009 that since the project outlay was very high, the overhead was charged at 10 *per cent*. However, the costing of policy of NRSC did not permit to charge reduced overheads.

Project Code	Chargeable amount	Charged amount	Under costing	Remarks
1127	562.00	498.00	64.00	Overheads were charged only at 10 *per cent* instead of 25 *per cent* at the request of MoRD. NRSC reiterated the position in its reply of November 2008. DOS replied in July 2009 that since the project outlay was very high the overhead was charged at 10 *per cent*. However, the costing of policy of NRSC did not permit to charge reduced overheads.
1052	38.10	33.20	4.90	Overheads at 25 *per cent* excluding satellite data were not charged. NRSC in November 2008 and DOS in July 2009 replied that since the project involved mutual interest of NRSC and Central Research Institute for Dryland Agriculture, overheads were not charged. Reply is not acceptable since the project was taken up as a user project where overheads were required to be charged.
1017	70.65	70.00	0.65	Against chargeable administrative overheads of ₹ 7.89 lakh, NRSC charged only ₹ 7.24 lakh. DOS replied in July 2009 that overhead of 15 *per cent* were charged as approved by the competent authority. However, the costing policy of NRSC did not permit to charge reduced overheads.
1184	58.40	51.50	6.90	Against chargeable administrative overheads of ₹ 11.50 lakh, NRSC charged only ₹ 4.60 lakh. DOS replied in July 2009 keeping the technical importance of the project in mind, the overheads were reduced. However, the costing policy of NRSC did not permit to charge reduced overheads.
1040	70.00	56.00	14.00	Administrative overheads charged were waived since the order was a bulk order when there was no provision to waive overheads. DOS replied in July 2009 that overheads were not charged towards 4X enlargements. The costing policy of NRSC, however, did not permit to exempt enlarging from charging overheads.
1061	70.93	63.62	7.31	Administrative overheads charged were only 10 *per cent* instead of 25 *per cent*. DOS replied in July 2009 that since the project outlay was very high, the overhead was charged at 10 *per cent*. However, the costing of policy of NRSC did not permit to charge reduced overheads.
Total	**2650.32**	**2398.37**	**251.95**	

Annex -6 Enrolment at IIRS, Dehradun during 2003-09

(Reference Paragraph 7.2)

Year	Courses	M. Tech	M.Sc	PG Diploma	Certificate	CSSTE	Special	Short Term	Total
2003-04	Number of Courses	1	2	8	8	1	0	9	29
	Participants Planned	10	20	56	33	20	26	110	275
	Participants enrolled	13	18	23	25	21	26	123	249
	Percentage not enrolled	30	- 10	- 59	- 24	5	0	12	10
2004 -05	Number of Courses	1	2	8	8	1	0	9	29
	Participants Planned	10	20	56	33	20	75	110	324
	Participants enrolled	11	16	28	22	20	75	128	300
	Percentage not enrolled	10	- 20	- 50	- 33	0	0	16	- 7
2005-06	Number of Courses	1	2	8	8	1	0	10	30
	Participants Planned	10	20	56	33	20	128	130	397
	Participants enrolled	4	14	25	11	19	128	112	313
	Percentage not enrolled	- 60	- 30	- 55	- 67	- 5	0	- 14	- 21
2006-07	Number of Courses	1	2	9	8	1	0	13	34
	Participants Planned	10	20	56	33	20	193	136	468
	Participants enrolled	11	14	45	15	22	193	111	411
	Percentage not enrolled	10	- 30	- 20	- 55	10	0	- 18	- 12
2007-08	Number of Courses	1	2	9	8	1	0	12	33
	Participants Planned	10	20	56	33	20	281	126	546
	Participants enrolled	7	17	47	15	18	281	98	483
	Percentage not enrolled	- 30	- 15	- 16	- 55	- 10	0	- 22	- 12
2008-09	Number of Courses	1	2	8	8	1	0	9	29
	Participants Planned	10	20	56	33	20	60	130	329
	Participants enrolled	10	13	37	8	15	320	119	522
	Percentage not enrolled	0	-35	-34	-76	-25	433	-9	59
Average	**Percentage not enrolled**	**-7**	**-23**	**-39**	**-52**	**-4**	**34**	**-7**	**-3**

Annex - 7 Estimates and Actuals of major financial activities of NRSC for 2003-08

(Reference: Paragraph 8.4)

(Amount: ₹ in crore)

Year	Details	Grants-in-aid	Income	Total Receipts	Centre[57] Expenditure	Variable[58] Expenditure	Total Expenditure
2003-04	Estimate	9.00	58.75	67.75	49.67	21.20	70.87
	Actual	9.00	58.47	67.47	45.64	14.03	59.67
	Variation	0.00	0.28	0.28	4.03	7.17	11.20
	(Per cent)		(-) 0.5	(-) 0.50	(-) 8	(-) 33	(-) 16
2004-05	Estimate	9.00[59]	62.73	71.23	50.45	18.65	69.10
	Actual	9.00	77.57	86.57	48.33	19.22	67.55
	Variation	0.00	11.34	15.34	2.12	0.57	1.55
	(Per cent)		17	21.54	(-) 4	(-) 3	(-) 2
2005-06	Estimate	14.00	81.40	95.40	59.54	20.22	79.76
	Actual	14.00	70.11	84.11	56.03	11.73	67.76
	Variation	0.00	11.29	11.29	3.51	8.49	12.00
	(Per cent)		(-) 14	(-) 12	(-) 6	(-) 42	(-) 15
2006-07	Estimate	20.00	78.89	98.89	76.73	15.50	92.23
	Actual	20.00	84.92	104.92	53.51	24.46	77.97
	Variation	0.00	6.03	6.03	23.22	8.96	14.26
	(Per cent)		8	6	(-) 30	58	(-) 16
2007-08	Estimate	30.00[60]	109.90	139.90	80.73	32.59	113.32
	Actual	30.00	111.15	141.15	96.96	26.22	123.18
	Variation	0.00	1.75	1.25	16.23	6.37	9.86
	(Per cent)		1.5	0.9	20	20	9
2008-09	Estimate	N.A*	100.96	100.96	108.73	25.44	134.17
	Actual	N.A*	70.83	70.83	104.86	21.83	126.69
	Variation	N.A*	30.13	30.13	3.87	3.61	7.48
	(Per cent)		(-) 29.84	(-) 29.84	(-) 3.56	(-) 14.19	(-) 5.58

* Not Applicable since NRSC converted into one of the units of DOS from 1 September 2008.

[57] Expenditure against the budget approved by DOS for NRSC incurred on DOS funded programmes/ projects, administrative expenses, salaries etc.

[58] Expenditure on application projects for various users being executed by NRSC.

[59] Exclude ₹ 5 crore received from DOS towards its pension fund.

[60] Include ₹ 19.46 crore refunded by NRSC to DOS based on the audit observation in Paragraph No.5.8.3 of Report No.9 of 2006 (Union Government).