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ACTIVITIES OF NATIONAL REMOTE SENSING CENTRE

[Action Taken by the Government on the Observations/Recommendations of the Committee contained in their Sixtieth Report (15th Lok Sabha)]

DEPARTMENT OF SPACE

PUBLIC ACCOUNTS COMMITTEE 2013-2014

NINETY-NINTH REPORT

FIFTEENTH LOK SABHA

LOK SABHA SECRETARIAT
NEW DELHI

NINETY-NINTH REPORT

PUBLIC ACCOUNTS COMMITTEE
(2013-2014)

(FIFTEENTH LOK SABHA)

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DEPARTMENT OF SPACE

Presented to Lok Sabha on 6*th February,* 2014

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LOK SABHA SECRETARIAT
NEW DELHI

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* Elected w.e.f. 14th August, 2013 *vice Dr. Girija Vyas* appointed as Minister of Housing, Urban Development and Poverty Alleviation w.e.f. 17th June, 2013.

† Elected w.e.f. 3rd September, 2013 *vice* Dr. V. Maitreyan ceased to be a Member upon his retirement as a Member of Rajya Sabha w.e.f. 24th July, 2013.

‡ Elected w.e.f. 3rd September, 2013 *vice Dr. E.M. Sudarsana Natchiappan* appointed as Minister of State for Commerce and Industry w.e.f. 17th June, 2013.

INTRODUCTION

I, the Chairman, Public Accounts Committee (2013-14), having been authorised by the Committee, do present this Ninety-ninth Report (Fifteenth Lok Sabha) on Action Taken by the Government on the Observations/Recommendations of the Committee contained in their Sixtieth Report (15th Lok Sabha) on 'Activities of National Remote Sensing Centre' relating to the Department of Space.

2. The Sixtieth Report was presented to Lok Sabha/laid in Rajya Sabha on 30th August, 2012. Replies of the Government to the Observations/Recommendations contained in the Report were received on 20th February, 2013. The Public Accounts Committee considered and adopted the Ninety-ninth Report at their sitting held on 30th January, 2014. Minutes of the Sitting are given at *Appendix*-I.

3. For facility of reference and convenience, the Observations and Recommendations of the Committee have been printed in thick type in the body of the Report.

4. The Committee place on record their appreciation of the assistance rendered to them in the matter by the Office of the Comptroller and Auditor General of India.

5. An analysis of the Action Taken by the Government on the Observations/ Recommendations contained in the Sixtieth Report (Fifteenth Lok Sabha) is given at *Appendix*-II.

DR. MURLI MANOHAR JOSHI
Chairman,
Public Accounts Committee.

NEW DELHI;
31 *January*, 2014
11 *Magha,* 1935 *(Saka)*

CHAPTER I

REPORT

This Report of the Public Accounts Committee deals with the Action Taken by the Government on the Observations and Recommendations of the Committee contained in their Sixtieth Report (Fifteenth Lok Sabha) on 'Activities of National Remote Sensing Centre' based on C&AG Report No. 21 of 2010-11 (Performance Audit), Union Government (Scientific Departments) for the year ended March 2009, relating to the Department of Space.

2. The Sixtieth Report (Fifteenth Lok Sabha), which was presented to Lok Sabha/ laid in Rajya Sabha on 30th August, 2012, contained 25 Observations and Recommendations. Action Taken Notes in respect of all the Observations and Recommendations have been received from the Department of Space and are broadly categorized as under:

(i) Observations/Recommendations which have been accepted by the Government:

Para Nos. 1-4, 6-9, 11, 13-18, 20-25

Total: 21
Chapter-II

(ii) Observations/Recommendations which the Committee do not desire to pursue in view of the replies received from the Government:

Para Nos. 5, 10 and 19

Total: 3
Chapter-III

(iii) Observations/Recommendations in respect of which replies of Government have not been accepted by the Committee and which require reiteration:

Para No. 12

Total: 1
Chapter-IV

(iv) Observations/Recommendations in respect of which Government have furnished interim replies:

-NIL-

Total: Nil
Chapter-V

3. The detailed examination of the subject by the Committee had revealed many significant deficiencies and fundamental weaknesses that resulted in underutilization

of remote sensing satellites and their applications which had not only stalled timely achievements of important national development goals with 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. but also impinged upon the nation's endeavour to be the frontrunner in remote sensing technologies, a very promising tool in the struggle for sustainable development. Keeping in view that the applications of remote sensing technology in particular have emerged as cost effective means for efficient management of national resources in the fields of agriculture, water resources, urban development and disaster management, the Committee had examined in detail the activities of the National Remote Sensing Centre, a unit of Indian Space Research Organisation (ISRO) under the Department of Space (DoS) and had found glaring lapses which *inter-alia* included underutilization of remote sensing satellites, poor revenue generation through sale of data products; under performance of aerial remote sensing aircraft; deficiencies in planning and implementation of remote sensing application projects undertaken by NRSC thereby affecting timely realization of expected benefits, shortfall in the enrolment in training courses in remote sensing and poor financial management. The Committee had accordingly given their Observations and Recommendations in their Sixtieth Report.

4. The Action Taken Notes furnished by the Department of Space in respect of all Observations and Recommendations of the Committee have been reproduced in the relevant Chapters of this Report. *The Committee will now deal with the Action Taken by the Government on the Observations and Recommendations made in the Original Report which either need reiteration or merit comments.*

I. Careful planning of design capacity of satellites emphasized for accurate assessment of their performance

Recommendation (Para No. 2)

5. While scrutinizing the subject in detail, the Committee had noted that three (IRS-P3, IC and P4) out of seven remote sensing satellites could utilize only 32, 45 and 50 per cent of their maximum capacity, which in the absence of their designed capacity, were assessed by Audit on the basis of comparison of actual number of scenes acquired by these satellites. The Committee had found that the satellites could not be put to use to their maximum capacity due to technical problems in the spacecrafts and the impact of lower capacity utilization on remote sensing application projects of national importance was not assessed by NRSC. In response, the Department of Space (DoS) had justified that all the three satellites in question had performed beyond their designed life of 3-5 years and the overall performance of the satellite exceeded the designed capacity of the mission. The DoS had further claimed that there had not been any deficit in terms of meting data requirements and remote sensing application projects did not suffer during the operational period of the satellites. Finding this reply deficient as it did not address the core issue of assessment of the performance of the satellites based on its designed capacity and the actual number of scenes captured, the Committee had recommended that important parameters such as the design capacity of satellites should be carefully worked out and planned so as to enable an accurate and scientific assessment of performance of satellites based on their actual capacity to capture

scenes. The Committee had also desired that emphasis of the Department of Space should be on maximum and effective data acquisition by the satellites rather than utilizing the satellites beyond their designed life as the lower capacity utilization of these satellites adversely impacted remote sensing application projects of national importance.

6. In its Action Taken Note, the Department of Space stated as under:—

"Design capacity of the satellite to capture scenes cannot be directly derived as there are many factors for considerations and these vary from one satellite mission to another and may be noted that this may not be unique for all earth-observation satellites. However, an estimated figure can be arrived at based on certain criteria/assumptions.

The design capacity depends on parameters, such as, spacecraft altitude, swath or ground coverage, stereability, revisit cycle, imaging payloads, use of onboard recorder and so on:

- Number of passes/coverage over India is to be primarily considered while estimating the design capacity, noting that spare capacity could further be used for international coverage;
- The presence/absence of International Ground Station (IGS) is another variable that will decide on the utilisation of the spare capacity for imaging. In addition, the user request for coverage outside Indian visibility circle decides the usage of onboard recorder/Solid State Recorder (SSR), if available on the satellite. The capacity of the SSR is also a limiting factor for such modes of data acquisition;
- For land-based studies, the ocean coverage may not be taken into account, particularly and the IRS 1C. However, IRS P4, due to its large swath and choice of multi-spectral bands, could be considered for all acquisitions;
- All images captured (inclusive of cloud infested scenes) are considered as part of capacity of satellite to acquire images. However, cloud infested images will not be usable/sellable as part of user-services; and
- About 10% of imaging and data acquisition may not be possible due to sensor calibration-validation exercises, exercises, in-orbit maintenance, orbit manoeuvres (once in 3 weeks) and other contingencies.

A senior level Inter-centre Committee will arrive at the formulation of guidelines for estimation of design capacity of Earth Observation Satellites for all future satellite missions, based on some of the above mentioned criteria/assumptions."

7. The Committee note the constraints expressed by the DoS in arriving at an accurate estimation of the design capacity of Satellites to capture scenes as many factors have to be taken into consideration which may not be unique for all Earth Observation Satellites. The Committee however note that pursuant to their recommendation, a senior level Inter-Centre Committee will arrive at the formulation

of guidelines for estimation of design capacity of Earth Observation Satellites for all future satellite missions, based on certain criteria/assumptions viz. spacecraft altitude, swath or ground coverage, stereability, revisit cycle, imaging payloads, use of onboard recorder, etc. The Committee would like to be apprised of the time-frame within which the Inter-Centre Committee would be able to formulate the guidelines.

II. Inadequate thematic data need assessment for realistic planning of payloads of Satellites

Recommendation (Para No. 7)

8. In their Report, the Committee noted that a realistic thematic data need assessment in various remote sensing applications was required to enable the planning of the payloads of operational remote sensing satellites prior to their launch so that the data acquisition capacity of the satellites were in tune with the expected needs. The Committee were, however, dismayed at the Audit revelation that satellites were planned without adequate thematic data need assessment and therefore, the extent of data gap against the data need could not be assessed and observed that the Departmnent's reply, by their own admission underlines the imperatives of data need assessment for planning the payloads of satellites. Though the Committee appreciated the Department's efforts to collect information on the intended use for data products disseminated by NRSC and development of a CRM module under IMGEOS project, which was expected to be put in operation in 2012, and hoped that the module was made operational within the stipulated time and monitored at the highest level at attain the objectives, they also desired that collection of information by Customer Relations Management (CRM) module may be institutionalized to contain clear outcomes to ensure a realistic assessment of data needs to enable a scientific correlation in the planning and operationaslisation of remote sensing satellites.

9. The DoS in its Action Taken Note has stated as under:—

> "As per Committee's recommendation, NRSC will institutionalise the Customer Relations Management (CRM) activity as soon as the software application module is ready (which is currently under development and the beta version is likely to be ready by March 2013).
>
> NRSC is continuously assessing the data needs of the users through various mechanisms, such as, feedback surveys, feedback during annual user interaction meet, CRM inputs (planned) and also through regular meetings of the thematic NNRMS Standing Committees and PC-NNRMS.
>
> The feedback mechanism comes through Planning Committee of National Natural Resources Management System (PC-NNRMS) which is an inter-ministerial standing committee, chaired by Member (Science), Planning Commission with Secretaries of various ministries as members for effective utilisation of space based remote sensing data."

10. The Committee note that the NRSC was to institutionalize the Customer Relations Management (CRM) activity purportedly by March, 2013. The Committee regret to observe time overruns in the development of the CRM module under IMGEOS

Project which was earlier expected to be in operation by 2012. The Committee, therefore, reiterate that appropriate mechanism be put in place for conduct of an exhaustive and realistic data need assessment to enable a scientific correlation in the planning and operationalisation of individual remote sensing satellites. The Committee further desire that development of the CRM module be expedited and the Committee apprised.

III. Technological upgradation for enhancement of quality and credibility of IRS data

(Recommendation Para No. 12)

11. In their Sixtieth Report, the Committee had noted that the international market rate of high resolution satellite data was about six times more than the price of comparable IRS products. In response thereto, DoS stated that IRS data available were not comparable with foreign satellite data with respect to pectral and spatial resoltuion and hence their prices were not comparable. The Committee had observed that the Department's reply itself indicated an urgent need for further enhancement in the quality of IRS data in order to reach cutting edge compatibility in the international market and had exhorted DoS to put in place suitable mechanisms in consultation and collaboration with renowned scientists and technocrats leading to constant technological upgradation, elimination of bottlenecks and enhancement of quality and credibility of IRS data.

12. The Department of Space, *vide* its Action Taken Note has stated as under:—

"For International users, the rates of Indian Satellite data are on par with international rates. However, for Indian users these images are provided at a subsidised price for the purposer of public good and national development, particularly after NRSC has become a Government agency since November 2008.

The quality of data being provided by the IRS series of satellites is on par with any other satellites. The diversified spectral, spatial, radiometric and temporal resolutions provided by IRS satellites address all aspects of resource mapping and monitoring at various scales. Due to such diversified options available from IRS platforms, varieties of projects at National, Regional, State and local level are successfully implemented by various ministries and other user groups. The NNRMS system has got richly benefitted from such unique possibilities provided by these satellite platforms.

IRS Satellites are state-of-the-art in terms of technology and their capabilities to provide best quality data to the user community. There are different classes of IRS satellites providing services, ranging from coarse, medium and high spatial resolution imaging, that address specific user requirements.

The high resolution class of imaging for cartography is addressed by CARTOSAT series of satellites. Amongst such class of satellites CARTOSAT-2 has capability to provide images at less than 1m spatial resolution.

Technology-wise the capabilities demonstrated by IRS series of satellites have been one of the best in the world. For instance, the CARTOSAT-1, with its stereo viewing and high resolution mapping capabilities has enabled 3 dimensional mapping of the country and the globe (through many international ground stations across the globe); OCEANSAT-2, with its capabilities of ocean colour monitoring and Ku band pencibeam scatterometer data, is a unique satellite system in the world providing global data services. In addition to this, with the successful launch of MEGHATROPIQUES, a unique Indo-French joint setellite mission is a contribution to the Global Precipitation Mission which is yet another important achievement. Further, ISRO/DoS has recently launched yet another unique satellite, RISAT-1, the RADAR imaging Satellite with Synthetic Aperture Radar (SAR) based imaging capabilities. This has registered India amongst few countries, with microwave remote sensing capabilities RISAT-1 is one of the most complex satellite missions and also the heaviest remote sensing satellite launched by PSLV C19.

During the 12th FYP, the missions that are being planned, use state-of-the-art technology, such as, very high resolution CARTOSATs with resolution of the order 0.65m and 0.25m, improved OCEANSAT with spatial multispectral bands for Sea Surface Temperature, Scatterometer, Geo Imaging satellite-GISAT (enables frequent/near-real time imaging from geosynchronous platform), ideally suited for disaster management and frequent monitoring of events on the earth surface, INSAT-3D, the improved weather and meteorlogical observation of next generation with Imagers and Sounders.

Hence, the Indian Remote Sensing missions are comparable with international class of satellites and the same is pursued even during the 12th FYP with state-of-the-art technology for supporting varieties of developmental activities in the country. The data from these satellites, not only serves as public good but also has potential for commercial exploitation for value added products and services. In addition, this will also address the purpose of monitoring disasters, weather forecasting, climate change and resource monitoring and planning."

13. The Committee are perturbed to note an apparent contradiction in the replies furnished by the DoS pertaining to the Committee's observation of prices of comparable IRS products of high resolution satellite data, being much lower than the international market rate. While the Department of space had earlier submitted that IRS data available were not comparable with foreign satellite data with respect to spectral resolution resulting in price differential, it has now stated that the quality of data being provided by the IRS series of satellites is no par with any other satellite and the data from these satellites, not only serves as public good but also has potential for commercial exploitation for value added products and services. The Committee desire that the ambiguities in the responses made by the DoS in this context be clarified. The Committee are dismayed to observe that the reply of the DoS is silent on the aspect of the recommendation pertaining to setting up of systemic mechanism in consultation and collaboration of renowned scientists and technocrats for constant technological upgradation and enhancement of quality and credibility of IRS data.

While reiterating their recommendation, the Committee also demand a firm commitment from the DoS on this aspect as well.

IV. Exploration of possibilities to induct and retain pilots

Recommendation (Para No. 14)

14. The Committee, in their Sixtieth Report, had noted the delay in completion of aerial projects and underperformance of aerial remote sensing aircraft due to non-availability of pilots and technical snags. Further, 12 aerial projects constituting 33 percent of those scrutinized by Audit, costing ₹ 45.85 crore, were delayed from 8 to 54 months. The Secretary, DoS, during evidence, attributed the non-availability of pilots to greener pastures available in the aviation market. The Committee were informed that an institutional arrangement has been established with the Indian Air Force (IAF) for obtaining pilot on deputation and efforts were being made to increase the deputation period so as to have higher stability in operations. In this regard, the Committee had recommended that besides such institutional arrangements, other avenues for induction and retention of pilots by devising attractive wage structure and other incentive packages should be explored so as to obviate scope for delays in projects and underperformance of aircraft due to want of pilots. The Committee also desired that DoS explore the possibility of having a tie-up with various prestigious academies and institutes in the country by obtaining their services and finally absorb these skilled pilots.

15. The Department of Space *vide* its Action Taken Note has submitted that a Committee constituted by Director, NRSC is working on the salary/incentive scheme for pilots and aircrew and will also give recommendations on hiring on pilots.

16. Apprehensive of the actue shortage of pilots adversely affecting smooth functioning of aerial remote sensing projects, the Committee had recommended certain tangible measures to be explored by the Department of Space. In this regard, the Department has now merely informed that a Committee constituted by Director, NRSC is working on the salary/incentive scheme for pilots and aircraft which will also give recommendations on hiring of pilots. While reiterating that DoS should also explore other possibilities of recruitment through aviation academies and instututes besides the proposed incentive scheme for hiring/retention of pilots, the Committee desire that the Committee constituted by Director, NRSC gives its recommendations on hiring of pilots epeditiously, sanctioned strength of the pilots be filled up with skilled persions at the earliest and the Committee apprised.

V. Non-Achievement of targeted objectives by Village Resources Centre (VRC) and Disaster Management Support Programme (DMSP) implemented by NNRMS

Recommendation (Para No. 18)

17. In their Sixtieth Report, the Committee were pained to note that the Village Resources Centre (VRC) and Disaster Management Support Programme (DMSP), projects of national importance directly implemented by NNRMS through DoS, could not achieve the desired results. Audit review of performance of VRC coordinated by NRSC covering the period from October 2007 to August 2008 revealed that targets for

setting up VRC nodes could not be met with only 473 VRC nodes set up in 22 States/ UTs across the country. The Committee expected the DoS to set up remaining VRC nodes at the earliest so that the aim of making satellite based services directly accessible to rural population was fully achieved. The Committee further noted that in DMSP, as much as 92 per cent of the funds amounting to Rs. 86.90 crore released for coping with floods, agricultural drought, earthquake, landslides, forests fires etc., to the NRSC as well as assets worth Rs. 7.80 crore remained unutilized with the NRSC. The Committee had desired that further release of funds for DMSP may be withheld until Utilization Certificates for the previous amounts released were submitted to the satisfaction of the DoS. Further, taking note of the fact that the VRC and DMSP could not discharge their assigned mandate due to non-availability of satellite communication bandwidth, the Committee desired the Department to take appropriate steps to enhance their technological capacity to meticulously tackle such problems so that such vital national projects were not rendered dysfunctional.

18. The DoS *vide* its Action Taken Note has stated as follows:—

"Village Resource Centre (VRC) was established using EDUSAT satellite under VRC Programme. Due to the de-commissioning of EDUSAT for operational services, the functioning of VRC and expansion activities were discontinued. With the launch of GSAT-12 in July, 2011, necessary transponders for re-activating the VRCs are allotted.

The DMS Programme coordinated by ISRO HQ. includes various components such as:

(i) Monitoring of major natural disasters using satellite and aerial data towards damage assessment and Dissemination of products and services through Decision Support System at NRSC;

(ii) Creation of digital databases for facilitating hazard zonation and multi-hazard risk assessment, including the development of the National Database for Emergency Management (NDEM);

(iii) Acquisition of close contous data for hazard prone areas using Air-borne Laser Terrain Mapper (ALTM) and Large Format Digital Camera (LFDC);

(iv) Development of Air-borne Synthetic Aperture Radar (ASAR) towards all-weather monitoring capability;

(v) Developing satellite based emergency communication equipments and strengthening the communications network with satellite based, secure, Virtual Private Network (VPN); and

(vi) Partaking in the relevant international initiatives, such as, International Charter, Space and Major Disasters and Sentinel Asia.

Out of the above components, (i), (ii), (iii) and part of (vi) are mainly being carried out by NRSC and the rest are carried out by Space Application Centre, Ahmedabad.

The unspent balance as mentioned in the Committee report was for procurement of aircraft and operationalization of ALTM.

Efforts to procure a dedicated aircraft were initiated in 2005 to augment the aerial survey capabilities during a disaster. To facilitate the early realisation of the aircraft, Rs. 65 crores were transferred to NRSC in 2006-07. However, unreasonable and unexpected price hike, midway of negotiations by the aircraft supplier, forced the Department to cancel the procurement process which was duly approved by the 115th Space Commission during March 2010.

Similarly, the Airborne Lazer Terrain Mapper (ALTM) procurement and operationalization, initiated in 2003, had faced problems in the initial period but subsequently made opertational by 2007. Using ALTM, close contour maps have been generated for more than 43,000 sq. kms. area till date, and the efforts are being continued in a systematic manner.

It may also be noted that, in 2008. NRSC has become fully Government and hence, no amount is transferred to NRSC and only authorisation to utilise budget is provided. DoS is taking all measures to review the budget periodically and emphasising on the realistic budget estimates and the realisation of the same within the budget year.

Further, it is brought to the notice of the Committee that the DMS programme was having required of satellite communication bandwidth. The Virtual Private Network operating in Extended C-Band connecting 20 States Emergency Operation Centres, 10 data providing nodes and 5 monitoring nodes were opertional since 2006 using a transponder on EDUSAT satellite. On decommissioning of EDUSTAT in September 2010, the services were restored using 13Mhz bandwidth in INSAT-3E. Further on operationalisation of GSAT-12 in 2012, full services were restored using a complete transponder on GSAT-12. Similarly, the emergency communicational using disasters is continued unhindered using INSAT Type-D satellite phones operational through INSAT-MSS transponder and Fishermen Distress Alert Terminals (DAT) through INSAT DRT transponder."

19. The Committee are pleased to note that in pursuance of their recommendation, the DoS has made efforts to revitalize the Village Resources Centre (VRC) and Disaster Management Support Programme (DMSP) and also taken measures for formulation of realistic budget estimates. The Committee however note with concern that though the DoS stated that the DMS Programme has the required Satellite Communication Bandwidth and the emergency communication during disaster is continued unhindered using INSAT Type-D Satellite phones operational through INSAT-MSS transponder, the effectivenss and actual emergency preparedness remains questionable in view of the deficiencies/ weaknesses brought out by CAG's Audit Report No. 5 of 2013 on Performance Audit on 'Disaster Preparedness in India' as also the recent natural calamity in Uttarakhand. The efforts initiated by DoS are apparently far from adequate given the stupendous task of Disaster Management Support Programme.

The Committee, therefore, recommend that DoS needs to review the programme after a comprehensive evaluation in the light of its effectiveness to cope up with the recent natural disasters that occurred in the country and devise appropriate remedial measures to ensure achievement of the targeted objectives within a stipulated time-frame. The Committee may be apprised of the action taken in the matter within a period of three months of presentation of this Report.

CHAPTER II

OBSERVATIONS/RECOMMENDATIONS WHICH HAVE BEEN ACCEPTED BY THE GOVERNMENT

Observation/Recommendation

The Committee are concerned to note that three (IRS - P3 IC and P4) out of seven remote sensing satellites could utilize only 32, 45 and 50 per cent of their maximum capacity, which in the absence of their designed capacity, were assessed by Audit on the basis of comparison of actual number of scenes acquired by these satellites. The Committee finds that the satellites could not be put to use to their maximum capacity due to technical problems in the spacecrafts and the impact of lower capacity utilization on remote sensing application projects of national importance was not assessed by NRSC. The Department of Space (DoS) justified that all three satellites in questions have performed beyond their designed life of 3-5 years and the overall performance of the satellite exceeded the designed capacity of the mission. The DoS further claimed that there had not been any deficit in term of meeting data requirement and remote sensing application projects did not suffer during the operational period of satellites. The Committee find the reply deficient as it gives a relative assessment of the performance of satellites based on designed life time of the satellite and does not address the core issue of assessment of the performance of the satellites based on its desinged capacity and the actual number of scenes captured. The Committee, therefore, recomend that important parameters such as the design capacity of satellites should be carefully worked out and planned so as to enable an acurate and scientific assessment of peformance of satellites based on the their actual capacity to capture seenes. The Committee further desire that emphasis of the Department of Space should be on the maximum and effective data acquisition by the satellites rather than utilizing the satellites beyond their desinged life as the lower capacity utilization of these satellites adversely impacts remote sensing application projects of national importance.

[Sl. No.1, Para 2 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Design capacity of the satellite to caputre scenes cannot be directly derived as there are many factors for consideration and these vary from one satellite mission to another and may be noted that this may not be unique for all earth observation satellites. However, an estimated figure can be arrived at based on certain criteria/assumptions.

The design capacity depends on parameters, such as, spacecraft altitude, swath or ground coverage, stereability, revisit cycle, imaging payloads, use of onboard recorder and so on:

- Number of passes/coverage over India is to be primarily considered while estimating the design capacity, nothing that spare capacity could further be used for international coverage;

- The presence/absence of International Ground Station (IGS) is another variable that will decide on the utilisation of the spare capacity for imaging. In addition, the user request for coverage outside Indian visibility circle decides the usage of Onboard Recorder/Solid State Recorder (SSR), if available on the satellite. The capacity of the SSR is also a limiting factor for such modes of data acquisition.
- For land-based studies, the ocean coverage may not be taken into account, particularly and the IRS 1C. However, IRS P4, due to its large with swath and choice of multi-spectral bands, could be considered for all acquisitions;
- All images captured (inclusive of cloud infested scenes) are considered as part of capacity of satellite to acquire images. However, cloud infested images will not be usable/sellable as part of user-services;
- About 10% of imaging and data acquisition may not be possible due to sensor calibration-validation exercises, in-orbit maintenace, orbit manoeuvers (once is 3 weeks) and other contingencies.

A senior level inter-centre committee will arrive at the formulation of guidelines for estimation of design capacity of Earth Observation Satellites for all future missions, based on some of the above mentioned criteria/assumptions.

Vetted Comments of Audit

DoS had expressed the constraints in the data product generation capability from a remote sensing satellite. The design capacity is the capacity of the satellite to acquire certain number of scenes which is an absolute figure. DoS may fix the design capacity of each satellite as recommended by central PAC. Please state whether the Inter-Centre Committee has been constituted and whether a time-frame has been determined for preparation of the guidelines. Terms of reference for the committee may also be indicated to the Committee.

Sd/-

(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee note that various mechanisms have been formulated by the DoS for utilization of remote sensing satellites to their full potential. These include setting up of the National Natural Resources Management System (NNRMS) for integration of satellite remote sensing data with conventional techniques towards management of natural resources and development planning in the country, holding of interaction meetings with various user Ministries/Departments on need basis, institutionalization of remote sensing in many ministries/Departments, upgradation of the capability of the Earth observation satellites and the mission management strategy to ensure

optimum use of available resource. The Committee desire that the synergy of information obtained from remote sensing and complimentary geomatics technologies such as Geographical Information System (GIS), Global Positioning System (GPS), Cartography, Graphical Processing, Statistics, Photogrammentry, etc. along with ground based socio-economy data should be utilized judiciously for achievement of national development goals as set out in the NNRMS. The Committee further recommend that DoS should ensure effective implementation of the mechanisms put in place to optimize the performance of the remote sensing satellites and also institute a robust monitoring system so that there are quantifiable positive outcomes.

[Sl. No. 2, Para 3 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

DoS/ISRO ensures that the synergy of information obtained from remote sensing add complimentary geomatics technologies such as Geographical Information System (GIS), Global Positioning System (GPS), and data processing along with field data is utilized judiciously for achievement of national development goals under NNRMS setup.

The mechanisms of NNRMS Standing committees (9 thematic Committees) and the Planning Committee of NNRMS has been effectively administering the mechanisms for proper utilization of remote sensing technology by the user ministries. Regular review meetings are being held to ensure necessary monitoring of all activities under NNRMS. The 18th Meeting of PC-NNRMS was held on July 18, 2011, while 19th Meeting was held on June 26, 2012. The meetings of the respective NNRMS Standing Committees were also held to the PC-NNRMS meetings to facilitate discussion of specific issues by the concerned ministries on the use of technology.

- DoS/ISRO has established the following mechanism to link the data need assessment while planning of payloads and their utilization as part of applications. The system has been effective in ensuring the use of remote sensing and geospatial technologies in various departments that has led to institutionalization mechanism. For example,:
- The biennial forest cover monitoring by Forest Survey of India (FSI), MoEF, using digital image processing and geospatial technologies is a good example in forestry sector;
- Providing regular information on Potential Fishing Zones (PFZ) to fishermen in the coastal areas using satellite observations, ocean state forecasts and setting up of a Tsunami advance warning system by INCOIS, MoES in the oceanography sector;
- Crop forecasts using satellite remote sensing and the recent commissioning of Mahalanobis National Crop Forecast Centre (MNCFC) by MoA in Agriculture sector.

- Also, a comprehensive Water Resources Information System (India-WRIS) is already implemented for CWC, MoWR as a part of decision support system, using earth observation and GIS technology, which is hosted as a web portal for usage.
- While Institutionalisation of remote sensing has successfully happened under MoEF, MoES, MoA, MoWR; other ministries like Department of Land Resources, MoRD, Department of Drinking Water and Sanitation, MoUD and others have been effectively using the technology for their respective requirements.
- The NNRMS system also ensure that all the States in the country effectively participate in using the technology within each of the State Governments. There are 27 State Remote Sensing Application Centres (SRSACs). All SRSACs work in close coordination with ISRO in implementing national missions, in addition to State's requirements. GIS, GPS and photogrammetry based techniques are effectively being used by the SRSACs.

  DoS/ISRO is also making all efforts to ensure effective implementation mechanisms to optimize the performance of the remote sensing satellites and their usage in various sectors.
- To ensure that earth observation data gets properly utilized by the Government, States, Private and Academia, DoS/PSRO has setup a mechanism of review through Earth Observation Applications—Management Council (EOA-MC), chaired by Director, Space Application Centre.

  The Council meets regularly to ensure that the technologies are effectively utilized by the user community.
- DoS/ISRO has also prepared its 12th FYP by taking necessary inputs from the user ministries, particularly with reference to the Earth Observation Satellites, that are proposed to be realised during the current plan period.

Vetted Comments of Audit

A national system of strategic management and performance measurement is essential for control and monitoring of organizational strategies at the national and departmental level. DoS has failed to clarify how the positives outcomes are proposed to be quantified through monitoring system on utilization of remote sensing satellites as recommended by the committee. DoS may therefore issue instructions to implement the recommendation of central PAC to ensure better control and monitoring.

Sd/-
(S. Srinivasan)
Additional Secretary

[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee are dismayed to note that while the total capital investment on the seven satellites in operation during the Audit review period was Rs. 1468.59 crore, operational returns were negative in the year 2003-08 and ranged from Rs. 96.87 crore to Rs. 134.27 crore indicating that realization from sale of data products was not sufficient enough to match its yearly operational expenditure. The Department of Space claimed in self-justification that the spacecraft systems are considered to be infrastructure for national development and public welfare and the emphasis is on the outreach of the data products rather than cost recovery. It was further asserted by DoS that the pricing policy of NRSC was in tune with the increasing global trend of making data freely available for public services. The Committee do not find the Department's justification convincing in so far as the relevant provision in the Remote Sensing data Policy, 2011 provides only an assurance from the Government for a continuous and improved observing/imaging capability from its own Indian Remote Sensing satellites programmes as a national commitment and a 'Public Good' and does not provide to give usable remote sensing satellite data free of cost. While acknowledging that remote sensing satellites are indeed public good infrastructure with the mission towards sustainable national development, the Committee, however feel that a balanced segregation can surely be worked out based on various data types and needs of various users. The Committee also feel that appropriate customized packaging of remote sensing data by way of adequate value addition and making them fit for synergistic and simultaneous application will definitely enhanced the marketability of such data and bring about increase in the net returns. The Committee, therefore, recommend that the Department should enhance their data marketing capability by way of appropriate packaging of data and value addition. The Committee also recommend that the Pricing Committee in the DoS should adopt a sustainable balanced approach to meet the twin objectives of making certain category of data available as public good free of cost while also simultaneously pricing another set of marketable category to bring about positive returns.

[Sl. No. 3, Para 4 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Considering the recommendations of the Committee necessary steps are taken by NRSC to provide data to the user segment both in terms of pricing and public good (free data) services. The reconstitution of pricing committee for satellite data products, under the chairmanship of Additional Secretary, DoS has reviewed the pricing policy and has recommended a well balanced mechanism of sectoral pricing (Government, Academia/Research and Private sectors). In additional, newer strategies are also recommended for enhancing the outreach and popularisation of IRS data amongst user community. The minutes of the meeting; EOS-35.3.2/2012 dated 27 December, 2012 is as in **Annexure I** and the summary of recommendations is enclosed in **Annexure II.**

NRSC is also enhancing the data marketing capability by the way of institutionalising the Customer Relations Management (CRM) software module, supply

of data products through FTP mode, improving the turn-around-time (TAT), increasing the number of value added products, making available the public good data through Bhuvan Geoportal, etc.

In the recent past, NRSC has taken initiatives in development of geophysical products to enhance further utilisation of remote sensing data by the users.

The pricing committee has taken note of these suggestions and is in the process of administering the same as part of costing/pricing exercise for all types of satellite data products from NRSC, ISRO.

Vetted Comments of Audit

The central PAC recommended that the Pricing Committee in the DoS should adopt a sustainable balanced approach to meet the twin objectives of making certain category of data available as public good free of cost while also simultaneously pricing another set of marketable category to bring about positive returns. DoS may therefore issue instructions to issue specific guidelines to the pricing committee in view of the recommendations of Central PAC and also work with Controller General Accounts for distinctly accounting receipts from remote sensing data/products.

Sd/-
(S. Srinivasan)
Additional Secretary

[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

ANNEXURE I

MINUTES OF THE MEETING OF PRICING COMMITTEE OF SATELLITE DATA PRODUCT HELD ON 22ND NOVEMBER, 2012 AT ISRO HQ.

Date: 27 December, 2012

The 4th meeting of the Pricing Committee for Satellite Data products was convened on 22nd November, 2012 under the chairmanship of Shri S. Srinivasan, Additional Secretary, DOS at ISRO HQ. The focus of the meeting was to address all aspects related to the guidelines and policies for satellite data pricing, while considering the fact that the costing exercise (document prepared by the committee and submitted to Ministry of Finance) is being looked into by the Advisor, Costing, Ministry of Finance for necessary guidelines and suggestions.

The list of participants, is given at Annexure-I.

Following are the salient points that emerged from the meeting.

1a. User Definition & Services

(i) All users located within India are defined as Indian users, irrespective of the location of the data requested by them. The prices applicable for such users are in Indian Rupees.

(ii) Users from SAARC and BIMSTEC countries are defined as users from neighbouring country and NRSC will be the focal point for data supply at Indian price, in equivalent US Dollars, except for Nepal (payment in Indian Rupees).

All other uses, except for SAARC and BIMSTEC countries, are defined as International users and ANTRIX will be the focal point for data supply. The applicable prices for this category of users are in US Dollars.

- The distribution of all free data downloads as defined in the Mission proposal/ document of ISRO/DOS of IRS Satellites, where NRSC operates Data Reception Station, will be through NRSC, irespective of user category.
- ANTRIX will facilitate obtaining a copy of the IRS data acquired by the International Ground Stations (IGS) for global archives, being maintained by NRSC. For sales of such archieved data, a Tripartite Agreement will be worked out between NRSC-ANTRIX-IGS.

1b. Presentations & Discussions

- Detailed presentation was made by Dr. Nagaraja, Member Secretary & GD-NDC, NRSC on the Costing aspects and the proposed Pricing methodology for IRS data,

- Both national and global scenarios were addressed with respect to free data availability, Satellite Data Sales and global pricing & costing polices. Particular reference was made to USGS for Landsat series, ESA for all its missions and third party missions, as well as Digital Global and Geoeye. Detailed cost tables, based on fixed and variable cost components and per-scene costs considering all parameters, were also presented. The proposed pricing strategies and policies were presented, in detail, and discussed by the committee.
- Mr. Manish Parmar, ANTRIX Corp. Ltd., presented the existing International prices, proposed prices for Resourcesat-1 & 2, Cartosat 1 & 2, Oceansat-2 and RISAT-1, He also presented the price comparison of other equivalent global datasets, proposed fee structure for downlink services, hardware and software components, Volume discounts and proposed discounts for academic proposals.
- Details on Resellers' discount to NRSC by the foreign satellite data providers and proposal to pass on the discounts to users was also specifically addressed as part of the meeting.

The following are the highlights of the meeting and discussions.

2.0 Salient Points discussed in the Meeting

2.1 Global Scenario

- Globally, moderate and low spatial resolution data are made available freely to the users.
- The United States Geological Survey (USGS) provides data based on Landsat Distribution Policy called COFUR (Cost of Fulfilling User Request) which is defined by the US 1992 Act as "the incremental costs associated with providing product generation, reproduction, and distribution of unenhanced data in response to user requests," and should not include the recovery of capital costs of satellites, ground systems, or other capital assets paid for by the Government. Accordingly, the Landsat 5/7 scenes were priced at USD 600.
- European Space Agency (ESA) provides free dataset from the ERS, Envisat and the Earth Explorer missions. For third party mission data, ESA prices are based on the cost of reproduction, which includes the direct costs associated with Physical media, human and computer resources for extracting from the archive and copying the required data, and quality control (ESA Third Party Mission Product Prices, Sep 2012). Accordingly the SPOT scenes were priced at 400 Euros and ALOS scenes at 50—75 Euros depending on zone of coverage.

2.2 Indian Scenario

- India is providing free data for selected datasets that are older than 2 years and coarser than 23m. Oceansat-2 Ocaen Colour Monitor-Global Area

Coverage (GAC) data, as well as Scatterometer data are being provided free of charge, globally, as per mission requirements.

- The product off-take trends for last 4 years indicate that about 80-90% of the satellite data are used by Government departments 8-12% by private and academic and 2 - 8% by foreign users. The increasing trend in data off-take can be attributed to the reduction in prices in the last few years. General trend shows that the users prefer less than 2 years latency in data.
- The demand for high resolution data has increased from a mere 13,000 sq. km during 2001-02 to about 5,00,000 sq. km in the current year.

2.3 Pricing Proposal for satellite data

- The data product cost were worked out considering fixed elements, such as, satellite cost, launch vehicle cost and variable cost elements, such as, in orbit operational cost, SVALBARD/ Tromso connectivity and downlink cost & NRSC variable elements such as depreciation, maintenance, operational consumables and manpower cost. The Access Fee earned by ANTRIX through IGS is considered as revenue, while working out the cost. The Access Fee earned by ANTRIX through IGS is considered as revenue, while working out the cost. The number of scenes considered for each mission is based on cloud free data over Indian footprints and saleable products for SSR and SVALBARD/ Tromso. Considering the above elements, the per-scene costs were computed.
- It has been decided that as a public good service, the satellite cost, the launch vehicle cost and in-orbit maintenance cost could be waived from price fixation for Indian users. Only the production cost for all four variable elements of NRSC (system, maintenance, consumables and manpower cost) could be considered as the base while pricing the satellite data.
- Considering various aspects, such as, the cost of different products, demand for data products, availability of contemporary satellite data and related policies, global trend for free data access, affordable data for public good/ societal benefit as per RSDP 2011 and the vision of NNRMS, it was decided to adopt a differential pricing policy/strategy.
- For Indian users, 3 categories of user-pricing were suggested.
    - For private users, the prices are proposed based on recovering all four variable elements, which NRSC incurs, *viz.,* (i) depreciation, (ii) maintenance, (iii) operational consumables, and (iv) manpower. This is termed as the base price.
    - For the Government and Academic users, the prices are proposed based on recovering only three variable elements (that is, excluding manpower cost).
    - For ISRO/DoS users, the prices are proposed based on recovering only two variable elements (that is, without manpower and depreciation).

Accordingly, the prices for both Government and Academic users are reduced by 40% from the base price and 60% for ISRO/DoS users respectively.

NRSC is also supplying the data products to BIMSTEC/SAARC users, which come under the visibility circle of NRSC data acquisition facility. The pricing for the BIMSTEC/SAARC users (neighbouring country users) is based on the base price, which is at par with Indian private users.

NRSC acquires IRS data at the earliest opportunity and provides them to national and international agencies, including Disaster Support Centre, International Charter, Sentinel Asia, etc within few hours of acquisition to cater to disaster support servies, The pricing fixed for all such data are at par with ISRO/DoS price.

- Apart from the digital data, the photo-products are also provided to users. The demand for photo product has been gradually decreasing over a period of time due to users shifting to digital data usage and presently, it is observed to be only 1% of total data off-take. Hence, considering the demand and reproduction costs, the proposed price for photo products are:

  Rs. 2000 for AO size and above

  Rs. 1600 for A1 size

  Rs. 1200 for A2 size

  Rs. 800 for A3 size and

  Rs. 400 for A4 size.

- To encourage users to opt for online data download through File Transfer Protocol (FTP) mode of electronic delivery, it is proposed to offer 5% discount.

- To promote the sales of archived data (older than 2 years from date of acquisition) for climate change/time-series analysis, it is proposed to offer 50% discount on the respective user category pricing, to only non-DoS users.

- To encourage the use of IRS data by Researchers & Academia from Indian Universities, it is proposed to offer 50% discount for the data that are less than 2 years old, However, the number of data products would be limited to a maximum of 5 products per Academic Institution/Department in a calendar year.

- It is also proposed to provide free data sets to Data Quality Evaluation (DQE) Group of ISRO/DoS Centres for activities related to mission calibration and performance evaluation of satellites and sensors.

2.4 New Pricing Strategies for improving off-take

- To encourage private users to utilize Indian Remote Sensing Satellite data, a new provision of volume discount may be administered as follows:
  - At the rate of 3%, for orders more than Rs. 10 lakhs and upto Rs. 25 lakhs
  - At the rate of 5%, for orders more than Rs. 25 lakhs and upto Rs. 1 cr.
  - At the rate of 10%, for orders more than Rs. 1 cr.
- Chairman, ISRO/Secretary, DoS has accorded approval for providing free downloads of selected data sets from IRS that are older than 2 years and coarser than 23 m spatial resolution. Accordingly, these free data download provisions are implemented through Bhuvan Portal and the effort would be continued.
- To provide continuous data to various user community in the country, subscription service is being newly proposed for Ocean Colour Monitor (Local Area Coverage-LAC), AWIFS, LISS-III, LISS-IV and CARTOSAT-1, The basic unit for consideration will be the region (say, 10,000 sq. km.)/State/ country. The user will be provided necessary data, irrespective of cloud cover, through subscription service, based on a yearly agreement. The suggested pricing for such subscription services is:
  - 25% of the user category price for OCEANSAT OCM, AWIFS and LISS-III data.
  - 50% of the user category price for IRS LISS-IV and CARTOSAT-1 data.
- With respect to licensing mechanism, three schemes are proposed, namely:
  - Base license (single user) — this permits use of IRS data by a single user.
  - Work Group license — this permits use of IRS data by 2 to 20 user groups within the same organisation/institution. An additional charge of 20% on the corresponding category price would be levied on such request.
  - Enterprise License — this permits the use of IRS data by more than 20 user groups with the country across organisation/institution. An additional charge of 40% on the corresponding category price would be levied on such request.
    - *Licensing mechanism*: Such Licensing mechanisms are worked out based on some of the international practices followed. One such example is that of Digital Globe which uses such mechanism. The implementation of such licensing is addressed as part of End-User-License agreement and is part of the Order form. The customer declares the number of users at the time of placing order. The declaration given by the user is considered as a valid commitment. Monitoring of such a licensing mechanism is not reported by any of international data providers, however there is a need to consider software based solution for

controlling the license usage, while providing the digital data to the user so that the number of licenses is automatically controlled. Also, it is noted that there is no upper limit for the usage of data, as indicated in the Digital Global End-user-agreement.

- It is proposed to charge 3 times the base price for those data requirement that could be web hosted by any user (other than ISRO/DoS) for non-commercial use:

  - *Data for Web user:* This aspect was discussed in the pricing committee meeting. As per NDC records, on an average, 3 to 4 users purchase the same scene. The proposal is that the primary-user uploads the scene purchased onto the web for multiple usage of the same data by different users. Due to multiple access of the same scene by different users, it is proposed to charge 3 times of base price for web users.

- Satellite derived products, like, Digital Elevation Model (DEM) are in demand by many users. The DEM with 30 m posting, is also made available as free downloads through BHUVAN, with due approval of the department. It is also proposed to provide DEMs with 10 m posting of the unrestricted areas based on approved pricing, on-request-basis to Government and Private Agencies (with due recommendation from Government Department). For private users and NGOs, the data will be the provided after necessary clearance of ISRO/DoS Internal Committee (which will be duly setup based on departmental guidelines). For restricted areas, the DEM with 10 m posting could be provided after necessary clearance from Internal Committee.

2.5 Passing of Resellers' Discount to the Users

- It was presented that commercial foreign data suppliers give reseller discount to NRSC, and also price the product differently based on volume of the order. The agents/resellers of foreign suppliers also approach users directly and promise additional discount.

- In order to make foreign data available to users at best price and also in view of NRSC being one of the ISRO/DoS centres, it is also proposed to pass on the discounts being provided by foreign data suppliers to users. However, it is proposed to charge 5% as handling charges to cover the cost incurred by NRSC, such as, administrative charges, morphing clearance handling etc., as well as actual Customs Duty levided by Customs and related handling charges.

2.6 ANTRIX Elements—Recommendations

2.6.1 IRS International Downlink price

- To enable a ground station for IRS data downlinking, ISRO proprietary

hardware and software are required to be installed. The following price list is proposed for hardware/software:

Satellite	All Prices in USD				
	DAQLB	DPGS	ADP	AFEH/PCA Card	TCT
RS-1	150,000	125,000	100,000	50,000	15,000
CS-1	150,000	150,000	150,000	50,000	15,000
CS-2	150,000	200,000	—	50,000	15,000
RS-2	150,000	125,000	100,000	50,000	15,000
RISAT-1	150,000	200,000	150,000	50,000	20,000

Note : *DAQLB: Direct Acquisition and Quick Look Browse system*
DPGS: Data Product Generation System
ADP : Ancillary Data Processing
AFEH : Advnce Front End Hardware
TCT : Time Code Translator

- In view of the current market trends and to bring flexibility in services, "per minute downlink" prices are proposed. The provision for customer's commitment to a minimum service will have to be included in the contract.
- The following "per minute downlink" prices are proposed for the International market:

Satellite	RS-1	CS-1	CS-2	RS-2	RISAT-1
Access fee (USD/Per Minute)	Awifs and LISS III Chain 1: 100 LISS IV Chain: 125	343	<500 min: 2500 501-1000 min: 2000 1001+min: 1500	Channel 1: 110 Channel 2: 140	445

Note: *RS: RESOURCESAT;* *CS: CARTOSAT*

- Based on the past experience with OCEANSAT-1, revision of existing OCEANSAT-2 prices are proposed. Antrix proposes 10,000 USD for single pass and 15,000 USD for two passes with an average of 300 and 500 passes per year respectively.
- The following hardware/software price list is proposed for OCEANSAT-2 satellite:

Hardware/Software	Price (USD)
Pre-Processing and Product Generation	100,000
Advance Front End Hardware (AFEH)	15,000
Time Code Translator (TCT)	10,000

2.6.2 IRS International Data Products Pricing

- It is proposed to maintain the existing price list for Resourcesat-1, Cartosat-1 and Cartosat-2 satellites. However, following pricing is proposed for Resourcesat-2 and RISAT-1 data products.

(i) Resourcesat-2 Pricing

- Based on the Resourcesat-1 experience and the current market scenario, following price list for Resourcesat-2 satellite data products are proposed:
  - LISS-3: 20% higher than RS-1 price
  - LISS-4 SMx: and Mono: 20% reduction as against RS-1 price
  - LISS-4 FMx: 3 times price of new SMx, as the swath of the data is 3 times
  - AWiFS: 20% higher as against RS-1 price

(ii) RISAT-1 Pricing

- Considering the market trend, competition with established market and the mission cost, the following international prices are proposed for RISAT-1 data products

Spatial Resolution	Coverage (km × km)	Scene Price (USD)
1m	10 × 100	8165
3m	25 × 25	3640
9m	25 × 25	1875
25m	115 × 115	2215
50m	220 × 220	1285

2.6.3 Policies for IRS International Data Sales/Services

- *Volume Discounts Policy:* Antrix proposes a discount policy for bulk orders. It is a common practice in the current international market to provide volume discounts to improve sales of data products. Hence, the following prices-slabs and discounts are proposed.
  a. For US$ 25,001 to 35,000, discount of 5% is proposed
  b. For US$ 35,001 to 50,000, discount of 8% is proposed
  c. For more than US$ 50,000, discount of 10% is proposed
- *Academic/Research purpose discount policy:* In order to encourage more usage of IRS data by research institutions and academia, 25% discount is proposed for academic institutions on fresh collects. This policy will not be applicable for archived data. A copy of the research paper/outcome will have to be provided to Antrix, with a right to use for promotional purposes.

- *Archive-data pricing policy*: Data older than 6 months from the date of acquisition may be classified as archive-data. A uniform discount of 25% is proposed for such data. The volume discount policy will not be applicable to archived data sales. The reseller discount will be only 10% and Internal Ground Station (IGS) will be 20% of the net price instead of 15% and 30% existing currently.

- *Sample data policy*: As per the International practices IRS sample data sets are required to be provided for to prospective distributors/resellers, users and ground stations. As practiced currently it is recommended to provide sample datasets at Indian price by NRSC to ANTRIX.

- *Per Square Kilometer (PSKM) pricing policy*: The current global trend for satellite data sales is based on PSKM. Antrix also has the PSKM pricing structure, but has limitations in terms of the minimum size of the area of interest. Hence, it is proposed to provide data on per square kilometers basis. However, minimum order has to be at least the size of one standard scene.

- *Delivery terms for the proposed pricing policy*: It is proposed to introduce delivery terms for the pricing policy for archive-data. Based on past experience and customers' requirements for fast delivery the following terms are proposed:

    - Normal delivery – Within 5 working days and up to 50 products at no extra charges
    - Express delivery – Within 3 working days and up to 10 products at 20% extra charges
    - Emergency delivery – Within 24 hours at 50% extra
    - Commission/discount is not applicable on the additional charges

  The above time-lines are applicable on receipt of order complete in all respects, at NRSC.

- International scenario of satellite data sales and competition is always dynamic and they change as per the market demand, international market, data usage trends and requirements . Considering these points, it is proposed to review the pricing policy/structure at least on an annual basis for possible revisions in prices. Committee may also revise prices at any time, depending on the need and requirements.

2. 7 Establishing foreign data downlink

Due to increased demand for HR data and most of the demand being met by foreign supplies, it was suggested to explore to establish down linking of foreign satellite data by NRSC ground station. This will help in building a archive of HR data, service multiple demand of same data, and help in providing value added services.

3.0 Committee suggestions

Following are the important points suggested by the Committee for necessary action:

- The guidelines discussed above could be considered as the Pricing Policy guidelines of ISRO/DoS.
- The pricing policy guidelines to incorporated in the final version of the Costing-Pricing document.
- The pricing policy guidelines may be put up to Space Commission for approval

Chairman of the Committee concurred with the above suggestion of the Committee. The meeting ended with thanks to the Chair.

Sd -
Prepared by

Dr. R Nagaraja,

Member Secretary, Satellite Data Pricing Committee.

Approved by:

Chairman, Satellite Committee

To

All Members/Invitees

ANNEXURE - I

LIST OF PARTICIPANTS

Mr. S. Srinivasan, Additional Secretary, DoS

Mr. A. Vijay Anand, Jt. Secretary, DoS

Dr. V.K. Dadhwal, Director, NRSC

Dr. V.S. Hegde, CMD, ANTRIX

Mr. P.G. Diwakar, Director, EOS

Mr. Thirunavukkarasu, Controller, NRSC

Mr. M. Venkat Rao, PD, ISAC – Rep. PD (IRS & SSS)

Mr. P. Kamalakar, HA&FA, NRSC

Dr. R. Nagaraja, GD, NRSC

Invitees

Dr. J. Krishnamurthy, Dy. Director, US&U, EOS

Mr. S. Parameswaran, ED, ANTRIX

Mr. Manish Parmar, Dy. Manager, ANTRIX

Mr. S. Arunachalam, NDC, NRSC

ANNEXURE - II

SALIENT RECOMMENDATIONS OF PRICING COMMITTEE

Indian, SAARC & BIMSTEC Pricing Policy

The Price of IRS digital data products for Indian user is recommended based on the expenditure involved by NRSC towards data acquisition, data processing and data dissemination related activities. Considering the commercial interest of the user category, utilization for public good srvices, data requirement for flagship programmes of Government of India, three categories of user pricing were recommended as follows:—

(a) For private and BIMSTEC/SAARC users, the prices are proposed based on the base price of all four variable elements of NRSC, that is, (i) depreciation, (ii) maintenance, (iii) operational consumables, and (iv) manpower and additionally, the market trend.

(b) For the Government and Academic users, the prices are proposed based on the base price of three variable elements (excluding manpower cost).

(c) For ISRO/DoS users, the prices are proposed based on the base price of two variable elements (without manpower and depreciation).

Accordingly, the prices for both Government and Academic users are reduced by 40% from the base price and 60% reduction are provided for ISRO/DoS users.

Photo Product Price

Apart from the digital data, the photo products are also provided to users. The demand for photo product has been gradually decreasing over a period of time due to users shifting to digital data usage and presently, it is observed to be only 1% of total data off-take. Hence the proposed price should be fixed considering the demand and reproduction costs.

Subscription service

India being a monsoon prone region, it is generally seen 4-6 months in a year is cloudy. However, the cludy scenes can be used for generation of time composites for better utilizaiton of the data. To provide continuous and layered data to various users in the country, subscription service is proposed for Ocean Colour Monitor (LAC), AWIFS, LISS-III, LISS-IV and Cartosat-1. In view of the above, pricing Committee recommended to provide all data acquired in a year to users based on an Agreement and advance payment as part of subscription service with the following discounts. The basic unit will be a region (10,00 sq.km.)/State/country. In case any partial data is not supplied to users due to technical difficulty, NRSC will reimburse the price on pro-rata basis.

- 25% of the user category price for OCM, AWIFS and LISS-III, and
- 50% of the user cateogry price for LISS-IV and Carto-1. The subscription service will made through entering in to yearly contract.

Web hosting

The Pricing Committee recommended to charge 3 times of base price to users who would like to purchase data and host on the website for non-commercial use.

Discounts

- All satellite data are being provided to users through media such as CD, DVD, Hard disk through courier/speed post. The FTP mode of delivery will make available data in near real time and cut the costs related to media and shipping. To encourage users to opt for FTP mode of delivery, it is recommended to offer 5% discount as per the existing practice.
- The data off take trend for last few years shows the preference for data less than 2 years old. Data older than 2 years accounted for less than 10% of the data supplied from 2008 to 2012. In order to promote the sale of archived data for different climate/change analysis studies, it is proposed to offer 50% discount from the respective user category price for the data older than 2 years to non DoS users.
- To encourage research programmes in the country, the Pricing Committee recommended for providing data, limited to a maximum of 5 products of less than 2 years old in a calendar year for academic institutions/department at 50% cost.
- To encourage utilization of satellite data by private users, the Pricing Committee recommended a new provision of volume discounts @3% for orders more than Rs. 10 lakhs, @ 5% for orders more than 25 lakhs and 10%for orders more than 1 crore.

Free data

- To create general awareness, to encourage research activities and as a public good service, ISRO is making available selected datasets older than 2 years latency, freely through its web portal called "BHUVAN". ISRO also is providing Oceansat GAC and Scatterometer data for scientific research, free of charge as envisaged in the Mission objectivies. The Committee recommended continuing such efforts.
- As part of mission calibration activity, the performance of the satellite and sensors are evaluated continuously. The datasets required for such activity by Data Quality Evaluation (DQE) are recommended to be provided free of charge.

Licensing

Generally the licensing and the price are dictated by the number of users. Accordingly, considering the international practices, the Pricing Committee

recommended 3 types of Licensing Schemes namely:—

(i) Base license (single user)—permits internal use of IRS data by the user,

(ii) Work Group license—permits internal use of data by 2-20 user groups within the same Government Departments with an upliftment of 20% on the base price, and

(iii) Enterprise License—Permits use of IRS data by more than 20 user groups within the country across departments with an upliftment of 40% on the base price.

Digital Elevation Model product

Satellite derived products, like, Digital elevation Model (DEM) are in demand by many users. The DEM with 30 m. posting, is also made available as free downloads through BHUVAN, with due approval of the department. It is also proposed to provide DEMs with 10 m. posting of the unrestricted areas based on approved pricing, on-request-basis to Government and private Agencies (with due recommendation from Government Department). For private users and NGOs, the data will be provided after necessary clearance of Geospatial Data Clearance Committee (GDCC) of ISRO/ DoS (which will be duly set up based on departmental guidelines). For restricted areas, the DEM with 10 m posting could be provided after necessary clearance from GDCC.

International pricing Policy

Pricing for data products

The Pricing Committee recommended International price considering fixed cost such as satellite cost, launch vehicle cost and variable cost such as in-orbit maintenance, SVALBARD/TROMSO data downlink and communicaiton cost, data products acquisition, generation and shipment cost, market trend, internaitonal price for similar satellites' data.

Pricing for Down-linking Services

- To operationalise International Ground Station (IGS) for IRS data downlink and processing, ISRO proprietary hardware and software are needed to be installed. It is proposed to continue the existing practices.
- In view of the current market trends and to bring flexibility in services, "per minute downlink"prices are proposed considering customer's commitment to a minimum service, current international downlink prices, and mission capabilities.

Discount Policy Data Sales/Services

- *Volume Discounts* : For bulk orders a discount policy is proposed considering the common practice in the current international market as under:
    a. For US$ 25,001 to 35,000 discount of 5% is proposed.
    b. For US$ 35,001 to 50,000, discount of 8% is proposed.
    c. For more than US$ 50,000, discount of 10% is proposed.

- *Academic/Research discount:* In order to encourage more usage of IRS data by research institutions and academia, 25% discount is proposed for academic institutions on fresh collects. This policy will not be applicable for archieved data. A copy of the research paper/outcome will have to be provided, with a right to use for promotional purposes.
- *Archive-data pricing:* Data older than 6 months from the date of acquisition may be classified as archive-data. A uniform discount of 25% is proposed for such data. The volume discount policy will be applicable to archived data sales.
- *Reseller Discount:* It is proposed to extend a discount of 10% to all Resellers registered with ANTRIX and a discount of 20% to International Ground Station (IGS) of the net price instead of 15% and 30% existing currently.
- *Sample data:* Sample IRS data to propective ground stations and resellers will be provided at Indian prices as practiced currently.
- *Per Square Kilometer (PSKM) pricing:* The current global trend for satellite data sales is based on Per Square Kilometer. hence, it is proposed to provide data on per square kilometer bases. However, minimum order has to be at least the size of one standard scene.
- *Delivery terms for the proposed pricing:* It is prosposed to introduce delivery terms for the pricing policy for archive-data. Based on past experience and customers'requirements for fast delivery the following terms are proposed:

    a. Normal delivery — Within 5 owrking days and up to 50 products at no extra charges.
    b. Express delivery — Within 3 working days and up to 10 products at 20% extra charges.
    c. Emergency delivery — Within 24 hours at 50% extra charges.
    d. Commission/discount is not applicable on the additional charges.

The above time-lines are applicable on receipt of order complete in all respects, at NRSC.

Observation/Recommendation

As regards the downward trend in the earnings through access fee/Royalty from the International Ground Stations (IGS) by Antrix, The Committee recommend that the DoS explore the possibility of collaboration with global remote sensing round station and research centres to establish closer linkages, more reliable and faster data sharing and analysis, shared archives and near real time data access among different countries and also establishing networks with higher bandwidth for distribution of archival repositories and provision of real time access.

[Sl.No. 5, Para 6 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Antrix is marketing services from Cartosat-1, Cartosat-2 and Resourcesat-2 satellites of international customers by participating in international conferences and exhibitions. Antrix has participated in the International Society of Photogrammetry and Remote Sensing (ISPRS)-2012 Australia and Bengaluru Space Expo (BSX-2012).

Currently, Antrix is in the process of establishing 2 new ground stations. It is also in receipt of many other requests for stabilizing business relations with new ustomers for services from IRS constellation for which necessary initiatives have been taken and will materialize these opprtunities on getting necessary clearances.

Antrix has also started discussions with customers for marketing of RISAT-1 data and services. Further steps will be taken in this direction after necessary instructions are issued by the Department with respect to the pricing aspect.

New policies are also proposed for IRS data and services to international customers; *viz.* archive data policy, policy for research activities etc. The proposal has been submitted to the concerned Committee for necessary directions. The Recommendations of the Committee is given at **Annexure-II**.

Vetted Comments of Audit

The specific action taken by Department of Space (not Antrix) based on the recommendation of Central PAC to explore the possibility of collaboration with global remote sensing ground station and research centres to establish closer linkages, more reliable and faster data sharing and analysis, shared archives and near real time data access among different countries and also establishing networks with higher bandwidth for distribution of archival repositories and provision of real time access, may be stated.

Sd/-
(S Srinivasan)
Additional Secretary

[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee note that a realistic thematic data need assessment in various remote sensing applications is required to enable the planning of the payloads of operational remote sensing satellites prior to their launch so that the data acquisition capacity of the statellites are in tune with the expected needs. In this context, the Committee are dismayed at the Audit revelation that satellites were planned without adequate thematic data need assessment and therefore, the extent of date gap against the data need could not be assessed. The Committee observe that the Department's reply, by their own admission underlines the imperatives of data need assessment for planning the payloads of satellites . The Committee appreciate the Department's efforts to collect information on the intended use for data products disseminated by NRSC and development of a CRM module under

IMGEOS project, which is expected to be put in operation in 2012, and hope that the module is made operational within the stipulated time and monitored at the highest level to attaain the objectives. The Committee also desire that collection of information by Customer Relations Management (CRM) module may be institutionalized and contain clear outcomes and DoS should ensure that a realistic assessment of date needs is conducted exhaustively to enable a scientific correlation in the planning and operationalisation of remote sensing satellites

[Sl No. 6, Para 7 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

As per Committee's recommendation, NRSC will institutionalise the Customer Relations Management (CRM) activity as soon as the software application module is ready (which is currently) under development and the beta version is likely to be ready by March 2013). NRSC is continuously assessing the date needs of the users through various mechanism, such as, feedback surveys, during annual user interaction meet, CRM input (planned) and also through regular meeting of the thematic NNRMS Standing Committees and PC-NNRMS. The feedback mechanism comes through Planning Committee of National Natural Resources Management System (PC-NNRMS) which is an inter ministerial standing Committee, chaired by Member (Science), Planning Commission with Secretaries of various Ministries as members for effective utilisation of Space based remote sensing data.

Vetted Comments of Audit

DoS may put in place a mechanism through specific executive orders/instruction specifying therein the guidelines and procedure to conduct realistic data need assessment exhaustively to enable scientific correlation in the planning and operationlisation of individual remote sensing satellites as recommended by Central PAC.

Sd/-
(S. Srinivasan)
Additional Secretary

[Department of Space, O.M. No. B.11011/7/2011 dated 5.12.2013]

Observation/Recommendation

Huge idling of IRS date ranging between 53 to 95 per cent, as highlighted by Audit, has engaged the attention of the Committee. This is a pointer to the fact that data need assessment was not based on any scientific study and lacked marketing capability. The Committee note that the Department of Space have made some efforts to initiate action to improve the utilization and sale of data by way of reduction in price level of satellite data products, increasing awareness through BHUVAN web portal, advertisements, publication of promotional materials, etc. The Committee, however, cannot help observing that reduction in scale prices of data to encourage their utilization might prove to be counterproductive as it is sure to bring down the net returns, which are already negligible. The Committee,

therefore, recommends that the DoS should set up a comprehensive mechanism to bring about optimum utilization of satellite date while also increasing the net returns from sale of such data. The Committee should like to be apprised of the mechnism so involved and the tangible outcome thereof.

[Sl No. 7, Para 8 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

As indicated under Para 4 specific actions are being taken by DoS/ISRO to address optimum utilisation of satellite data.

NRSC follows the data archival policy to store data periodically, following a time-series mechanism. The Data archival is done, not only for commercial exploitation but also to ensure that such data is available as and when required for utilisation in the interest of the nation, particularly for change detection and analysis. The data archived at NRSC is usable for climate change studies, land coverchange analysis, etc. or for any kind of monitoring activity that involves multi-date periodicity.

The action proposed under Para 2 and Para 7 will also address these aspects for evolving a comprehensive mechanism to bring about optimum utilisation of satellite data.

Vetted Comments of Audit

DoS may put in place a specific mechanism, through executive orders/ instructions, stipulating therein time-frame and tangible outcome which would ensure optimum utilisation of satellite data and would increase the sale of satellite date.

Sd/-
(S.Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B.11011/7/2011 dated 05.12.2013]

Observation/Recommendation

Notably, the efficiency of data processing is measured in terms of turn-around time, *i.e.*, the processing time required to process the data into a finished product from the time of receipt of request for data. The Committee deplore the decline in efficiency of data processing as there has been increase in the turn-around time, which has in turn adversely impacted timely delivery of data products to the users. The Committee expect that the DoS make earnest efforts to operationalize the project on Integrated Multi-Mission Ground Segment of Earth Observation Satellites (IMGEOs) which has been purportedly conceived to eable faster and efficient data products and services for users so as to bring about reduction in the turn-around time for standard products to 24 hours and emergency products to 1 hour after acquisition. The Committee are of the considered view that establishement of robust operational remote sensing, geospatial information systems and supporting infrastructure are critical to securing accurate and timely access to both archival and

real or near-real time reliable data. Keeping this in view, the Committee desire the Department to enhance the present infrastructure for remote sensing encompassing organization, computational, educational and bandwidth components, particularly as relates to time critical anticipation, disaster mitigation and emergency responses to both natural and manmade catastrophes. To this end, the Committee further impress upon the Department to strengthen and upgrade their software and other related geomatics technologies associated with the processing of data at par with the best international standards so as to ensure a quantum jump in the efficiency of data processing. The Committee also desire that ideal turn-around time be fixed for different categories of data processed at NRSC and a stringent mechanism be installed to monitor actually obtained turm-around time *vis-a-vis* prescribed.

[Sl No. 8, Para 9 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

The Department has taken necessary steps to address the points raised by the Committee by taking necessary steps to realise one of the best and state-of-the-art computational facility with required hardware, software and computation speed to meet the user requirements .

Integrated Multi-mission Ground segment and Earth Observation Satellites (IMGEOS)] which was commissioned during November 2011 at NRSC, Shadnagar, is fully operational and is already providing services to the user community. The facility has one of the best hadware and software capabilities to address all aspects of data acquisition, processing and dessimination with optimal turn-around-time. Following are the benchmark figures achieved:—

- Normal Products : 24 hours as against 4-5 days earlier.
- Emergency Products : 1 hour as against 24 hours earlier.
- Throughput rate : 1000 products per day as against 100-150 products/day earlier.

The facility is able to meet all types of use requirements with optimal turn-around-time. The facility is particularly of immense use under disaster and emergency situations when near-real-time data requirements are to be met.

IMGEOS data processing chain has time tagging for data processing and products disssemination, which is effective in monitoring the turn-around-time of data products on regular basis.

In addition, the department has provided many new geomatics solution for the user community through BHUVAN portal and also the deployment of "ISRO Geoportal" (a facility that provides a single-window gateway to various geospatial tools and data portals of ISRO/DoS), which enables various layers of natural resources data and related metadata information for the user community to browse, visualize and download as required.

Vetted Comments of Audit

DoS had indicated the benchmark to be achieved in the data processing time. DoS may issue specific instructions to fix the ideal turnaround time as recommended by central PAC. Further a mechanism to monitor actually obtain turnaround time *vis-a-vis* prescribed also needs to be installed by the Department.

Sd/-
(S.Srinivasan)
Additional Secretary

[Department of Space, O.M. No. B.11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee are in agreement with the views of the Standing Committee of Parliament on DoS contained in their 42nd Report presented to both the Houses on 13.03.1997 that more and more private entrepreneurs should be associated in the process of remote sensing data utilization programme as there is a huge scope of value addition to the remote sensing data and using it in marketable form in several sectors. The Committee are, however, dismayed to note that the efforts of NRSC are not adequate in customizing the data according to the needs of private users and also exploring the possibility of widening the customer base resulting in very low levels of average sales to the private sector. Audit examination revealed that the average sale to the private sector were less than 20 per cent whereas the sales to the Government sector more than 80 per cent during the period 2003-2009. The Committee recommend that a comprehensive mechanism for promotion of sale of data to private users incorporating therein effective sensitization programmes, training modules for efficient handing of such data and also value addition, customization and appropriate packaging of data to enhance their utility for multipurpose applications should be brought about and the Committee apprised accordingly.

[Sl. No. 10, Para 11 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

The Department has taken necessary measures to establish a comprehensive mechanism for promotion of sale of data to private users including the conduct of sensitization programmes, training modules for efficient handling of such data and also value addition, customization and appropriate packaging of data to enhance their utility for multipurpose applications.

The mechanism is set up for strengthening data sales to all sectors, including private users, through value addition and organising training programs for effective data utilization. Towards this following actions are taken:—

- Specific training programme has been conducted for Private Sector users and will be a regular feature:

Towards promoting Private Participation, in 2012 NRSC has organized an exclusive one-week training programme on "Geospatial Technologies for Private Entrepreneurs" and trained 18 personals. Two such courses are planned in 2013 in addition to an exclusive programme for women.

- Sensitization programmes are being organized at regional/state level under national application programmes by NRSC.
- Technical manuals/guidelines have been hosted in NRSC website.
- Customized geospatial web services are being hosted in BHUVAN.
- BHUVAN also provides platform to users to showcase their applications through spatial mashups.
- NRSC/NDC conducts annual National level User-meet, which enables all user community, including private users, to participate and get benefited. It is planned to hold the annual user-meet during 21-22 February, 2013.

Vetted Comments of Audit

DoS may issue specific instructions stipulating therein ways and means of improving the sale of data products to 'private users'. The guidelines may also specify the time with definite targets for improvements.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee have been given to understand that DoS has undertaken an exercise to gauge the total cost of remote sensing satellite systems and data products. While earlier only the cost incurred for generating data products was taken into consideration, now cost of the satellites and their launching will also be taken into account. The Committee also appreciate that the costing and pricing are being finalized by a high-power Committee set up by DoS and a differentiated pricing policy is being considered for different users like Government users, DoS users, academic users, private users, etc. The Committee, however, impress upon DoS to finalize and implement this pricing policy with a sense of urgency after due legal and financial vetting and the Committee be apprised within six months of its finalization.

[Sl. No. 12, Para 13 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

The pricing committee for satellite data products has prepared the draft report on costing and pricing and the same has been submitted to Chief Advisor Costing, Department of Cost, Ministry of Finance for vetting of costing methodology adopted by the department. Meanwhile the pricing policy and strategy has also been arrived at by the committee. The pricing committee has finalised the recommendations for data products pricing which is further being processed for approval (**Annexure II**).

Vettted Comments of Audit

DoS may finalise and implement the pricing policy with a sense of urgency after due legal and financial vetting as recommended by Central PAC. Further action awaited.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee are deeply concerned to note the delay in completion of aerial projects and under performance of aerial remote sensing aircraft due to non-availability of pilots and technical snags. The Committee further note that 12 aerial projects constituting 33 per cent of those scrutinized by Audit, costing Rs. 45.85 crore, were delayed from 8 to 54 months. The Secretary, DoS in evidence, attributed the non-availability of pilots to greener pastures available in the aviation market. Needless to say, this acute shortage of manpower to fly the aerial remote sensing aircraft is a major handicap in the smooth function of aerial remote sensing projects. The Committee are, however, informed that an institutional arrangement has been established with the Indian Air Force (IAF) for obtaining pilots of deputation and efforts are being made to increase the deputation period so as to have higher stability in operations. The Committee feel that besides such institutional arrangements, others avenues for inductions and retention of pilots by devising attractive wage structure and other incentive packages should be explored so as to obviate scope for delays in projects and under performances of aircraft due to want of pilots. The Committee also desire that DoS may also explore the possibility of having tie-up with various prestigious aviation academies and institutes in the country by obtaining their services and finally absorb these skilled pilots.

[Sl.No. 13, Para 14 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

A Committee constituted by Director, NRSC is working on the salary/incentive scheme for pilots and aircrew. It will also give recommendations on hiring of pilots.

Vetted Comments of Audit

The recommendations of the Committee and further action taken may be intimated. Action taken by DoS to explore the possibility of tie-ups with aviations academics and institutes may be stated.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee are informed that a three year comprehensive contract had been signed with a maintenance agency for reduction in delays in fixing technical snags, better flow of spare parts and facilitation of better supervision in carrying out

maintenance work. Retrofit of avionics system of two beach-craft owned by NRSC has also been planned to be carried out in a phased manner. As regards the replacement of ageing aircraft, the Committee were assured by DoS that the matter will be critically examined at an appropriate time. The Committee are surprised to note that it is only on being pointed out by Audit, the Department intimated steps to address the issue of technical snags of the aerial remote sensing aircraft. Needless to say, the DoS needs to be proactive and taken appropriate measures so that the work of remote sensing is not hampered due to technical snags.

[Sl.No. 14, Para 15 of the Sixtieth Report of the Public Accounts Committee (15the Lok Sabha)]

Action Taken

NRSC has taken note of the point highlighted and initiated necessary actions on getting repair works on the aging aircraftrs. NRSC has been directed to plan for procurement of two new aircrafts for phased replacement of ageing aircraft.

An Inter-Agency Technical Committee is set up *vide* Order No. D. 03/138/2013 dated January 07, 2013 to arrive at the technical specifications for procurement of these aircrafts.

Vetted Comments of Audit

Further action taken to procure two new aircraft may be intimated.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee cannot absolve the delay in completion of aerial remote sensing project on the ground that inter-agency consultations take time and that no time-frame can be predicted for such consultations. Mindful of the imperative need for expeditious release of the data collected by the remote sensing aircraft by the end users, the Committee hardly need to emphasize the urgency for efficient coordination between concerned. The Committee would like to be apprised of the new mechanism put in place to facilitate timely release of the data collected by the NRSC.

[Sl.No. 15, Para 16 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Some of the measures initiated for minimising delays in execution of aerial remote sensing projects are:—

- Conditions related to weather dependence for flying, change in scope of work by sponsoring agency etc. are being built into MoU clauses for arriving at realistic project schedules.

- Advance action being taken on field related works without waiting for completion of aerial survey tasks, wherever feasible.
- Advance intimations are being sent to users on release of timely payments to avoid delays in supplying the data.

Letter was sent to Secretary, Ministry of Defence (MoD) requesting for special dispensation for NRSC, similar to that followed in situations like disaster related aerial surveys, which will reduce time taken for approvals and security vetting by MoD to a large extent, NRSC continues to pursue with MoD for speeding up permission to fly and for data classification.

Vetted Comments of Audit

The Action Taken by DoS in complying to the recommendation of Central PAC, such as revision in MoU, advance action on field related works, collection of dues to avoid delay may be systematised by issuing executive order/instruction so that implementing division in NRSC would implement the decision of the department in individual cases.

Sd/-
(S. Srinivasan)
Additional Secretary

[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee note with concern lack of effective and periodic co-ordination in the implementation of projects of National importance under the National Natural Resources management Systems. Projects scuh as planning of irrigation schemes; mapping of wasteland to enable reclamation and rehabilitation thereof; and identification of drinking water sources could not fructify well in time for want of efficient and regular coordination. The Committee are particularly perturbed to note that even in the face of extreme water stress all over the country, the DoS failed to extent the much needed vital assistance in the implementation of the Rajiv Gandhi National Drinking Water Mission, Further, notably, the various Standing Committees under the NNRMS did not hold the regular meetings as mandated. The DoS needs to review the mandate of these Committees as also the desirability of replacing by more efficient and reliable system and the Committee apprised.

[Sl. No. 16, Para 17 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Specific action has been taken by the Department to ensure that all Standing Committees and PC-NNRMS meet regularly and the Committee is being apprised of the various requirements of different ministries and status updates of various on-going projects. PC-NNRMS has been reviewing the progress of the Standing Committees on a regular basis.

Some of the Projects mentioned in the para 17 have since been completed, such as Accelerated Irrigation Benefit Programme (ABIP) phase 1 is successfully completed and phase 2 has been initiated for 50 irrigation projects across 14 States and the project is progressing as per schedule. The wasteland mapping has been completed and the maps are provided to MoRD while national wasteland Atlas-2011 was also released for developmental purposes by the Ministry; and drinking water potential maps, as part of Rajiv Gandhi National Drinking Water Mission, has been accomplised in three phases (Phase 1, 2, 3A and 3B) and the database and maps are made available to the priority States for necessary use. Phase 4 of the project is initiated to address the water quality aspects at national level.

Department of Drinking Water Supply and Sanitation Ministry (DDWS), Government of India is the nodal department for implementation of Rajiv Gandhi National Drinking Water Mission taking help of the respective State Governments. The ministry is well cognitive of the fact that this scheme should cover the entire nation. However there is lead time required in formulating the project and implementing the same. Due to this reason, the implementation of this scheme was taken up in a phased manner in different states by the Ministry. Accordingly, the ministry had requested NRSC to prepare groundwater prospect maps using satellite images to enable them for targeting groundwater sites (bore well and hand pumps) in four phases with the funding from the ministry as follows:—

- Phase I—6, States namely Andhra Pradesh (part), Kerala, Karnataka, Chattisgarh, Madhya Pradesh and Rajasthan—Commenced by December 1998, Target of completion by June 2002 & completed by 2002;

- Phase II—4 States namely Orissa, Gujarat, Jharkhand & Himachal Pradesh—Commenced by August 2001 (Jharkhand) and October 2002 (Orissa, Gujarat, & Himachal Pradesh), Target of completion by 2005 & completed by 2005;

- Phase IIIA—6, States namely Maharashtra, Uttarakhand, Assam, Andhra Pradesh (remaining part from Phase I), Jammu & Kahsmir and Punjab—Commenced by February 2007, Target or completion by December 2009 & completed by 2009 (except Maharashtra and J&K by June 2011);

- Phase III B—4 States namely West Bengal & Uttar Pradesh in part, Arunachal Pradesh & Haryana—Commenced by March 2008. Target of completion by December 2010 & completed by December 2010;

- Phase IV—Rest of the country including Union territories and Islands—commenced by November 2010, Target of completion by December 2013. Phase IV also includes generation of maps with ground water quality layer for all the States, generation of digital database for the entire country and training programme for 600 state officials.

Maps generated under this project are submitted to respective state nodal departments as per the instructions of the ministry. Orientation training has also been imparted to state officials of the nodal departments on how to use the maps.

Vetted Comments of Audit

DoS may review the mandate of the Standing Committee under NNRMS and examine the desirability of replace these committees with more efficient and reliable system. Action taken in the matter may be intimated.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/17/2011 dated 05.12.2013]

Observation/Recommendation

The Committee are pained to note that the Village Resources Centre (VRC) and Disaster Management Support Programme (DMSP) which are projects of national importance directly implemented by NNRMS through DoS, could not achieve the desired results. Audit review of performance of VRC coordinated by NRSC covering the period from October 2007 to August 2008 revealed that targets for setting up VRC nodes could note be met, DoS, on being questioned by the Committee submitted that 473 VRC nodes have been set up in 22 States/UT across the country. The Committee expects the DoS to set up remaining VRC nodes at the earlier so that the aim of making satellite based services directly accessible to rural population is fully achieved. The Committee note that in DMSP, 92 per cent of the funds amounting to Rs. 86.90 crore released to the NRSC as well as assets worth Rs. 7.80 crore remained unutilized with the NRSC. The Committee seek explanation of the DoS for non-utilization of almost the whole of the funds released for coping with floods, agricultural drought, earthquake, landslides, forests fires etc.. The Committee also desire that further release for funds for DMSP may be withheld untils Utilization Certificates for the previous amounts released are submitted to the satisfaction of the DoS. Further, taking note of the fact that the VRS and DMSP could not discharge their assigned mandate due to non-availability of satellite communication bandwidth, the Committee desire the Department to take appropriate steps to enhance their technological capacity to meticulously tackle such problems so that such vital national projects are not rendered disfunctional.

[Sl. No. 17, Para 18 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Village Resource Centre (VRC) was established using EDUSAT satellite under VRC Programme. Due to the de-commissioning of EDUSAT for operational services, the functioning of VRC and expansion activities were discontinued. With the launch of GSAT-12 in July, 2011, necessary transponders for re-activating the VRSs are allotted.

The DMS Programme coordinated by ISRO HQ includes various components such as:—

(i) Monitoring of major natural disasters using satellite and aerial data towards damage assessment and Dissemination of products and services through Decision Support System at NRSC;

(ii) Creation of digital databases for facilitating hazard zonation and multi-hazard risk assessment, including the development of the National Database for Emergency Management (NDEM);

(iii) Acquisition of close contour data for hazard prone areas using Air-borne Laser Terrain Mapper (ALTM) and Large Format Digital Camera (LFDC);

(iv) Development of Air-borne Synthetic Aparture Radar (ASAR) towards all-weather monitoring capability;

(v) Developing satellite based emergency communication equipments and strengthening the communications netwok with satellite based, secure, Virtual Private Network (VPN); and

(vi) Partaking in the relevant international initiatives, such as, International Charter, Space and Major Disasters and Sentinel Asia.

Out of the above components. (i); (ii); (iii); and part of (vi) are mainly being carried out by NRSC and the rest are carried out by Space Application Centre, Ahemedabad. The unspent balance as mentioned in the Committee report was for procurement of aircraft and opertionalization of ALTM.

Efforts to procure a dedicated aircraft were initiated in 2005 to augment the aerial survey capabilities during a disaster. To facilitate the early realization of the aircraft, Rs. 65 crores were transferred to NRSC in 2006-07. However, unreasonable and unexpected price hike, midway of negotiations by the aircraft supplier, forced the Department to cancel the procurement process which was duly approved by the 115th Space Commission during March 2010.

Similary, the Air-borne Lazer Terrain Mapper (ALTM) procurement and operationalization, initiated in 2003, had faced problems in the initial period but subsequently made operational by 2007. Using ALTM, close contour maps have been generated for more than 4300 Sq. kms area till date, and the efforts are being continued in a systematic manner.

It may also be noted that, in 2008, NRSC has become fully Government and hence, no amount is transferred to NRSC and only authorization to utilise budget is provided. DoS is taking all measures to review the budget periodically, and emphasizing on the realistic budget estimates and the realization of the same within the budget year.

Further, it is brought to the notice of the Committee that the DMS programme was having required of satellite communication bandwidth. The Virtual Private Network operating in Extended C-Band connecting 20 State Emergency Operation centres, 10 data providing nodes and 5 monitoring nodes were operational since 2006 using a transponder on Edusat satellite. On decommissioning of EDUSAT in September 2010, the services were restored using 13Mhz Bandwidth in INSAT-3E. Further on operationalisation of GSAT-12 in 2012, full services were restored using a complete transponder on GSAT-12. Similarly, the emergency communication using disasters is continued unhindered using INSAT Type-D satellite phones operational through INSAT-MSS transponder and Fishermen Distress Alert Terminals (DAT) through INSAT DRT transponder.

Vetted Comments of Audit

Inspite of the action taken by DoS as given in the reply the desired results have not been achieved. This has been brought out in the CAGs Audit Report No. 5 of 2013 on P.A. on Disaster preparedness in India. DoS therefore needs to review the programme and take adequate steps to ensure achievements of the objectives set out under the reply.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No.B. 11011/97/2011 dated 05.12.2013]

Observation/Recommendation

The Committee further note that in operational projects for various users other than ACL, there were shortcomings such as delays in completion of projects, outstanding dues, wasteful expenditure, blocking of funds, under costing of projects and undertaking of projects without MoU rendering recovery of dues difficult. The Committee find that the reasons attributed for recovery of dues difficult. The Committee find that the reasons attributed for delays in many of these projects includes *inter alia* non receipt of scheduled payments from users, installation of new technology, time taken for security vetting, unfavourable weather conditions, naxal problems creating difficulties in ground survey, subsequent change in user specifications, logistics challenges and also time taken for getting necessary insputs form the project sponsoring agencies. The committee were assured that various mechanisms are being put in place in NRSC to expedite the process of completion of projects and minimize delays in carrying out operational projects such as conduct of regular monthly project progress review meetings, holding of extensive discussions and signing of MoU with projects sponsosring agencies to bring about standardization of uniform costing methodology, review of costing policy, preparation of Product Realisation Plan in the form of a Technical Manual, formation of a core team for management of each project etc. The Committee would like to be apprised to the corrective action taken to fulfil the assurances given to them in each area of deficiency/shortcoming.

[Sl. No. 19, Para 20 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

NRSC has fulfilled all the assurances given to avoid delay in complete of operational projects by making various structural and system built procedures like:

- Conducting of regular project progress review meetings.
- Discussions and Signing of MoU with project sponsoring agencies.
- Standardization of uniform costing methodology has been documented and is being reviewed by Chief Advisor Costing, Ministry of Costing.

- Preparation of Product Realization Plan in the form of a Technical Manual is being systematically followed.
- Formation of a core team for management of projects has been done for effective project management and monitoring.

Vetted Comments of Audit

The Action Taken by DoS in complying with the recommendation of Central PAC as enumerated above may be systematised by issuing executive order/instruction so that implementing divisions in NRSC could implement the decision of DoS in individual cases.

Sd/-
(S. Srinivasan)
Additional Secreatry
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee note that the 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 and its main function is capacity building through education at post-graduate level in the application of remote sensing and geo-informatics for natural resource management. Taking cognizance of the fact that capacity building is crucial in the endeavour towards optimum utilizaion of remote sensing satellite applications; the Committee find the shortfall in the enrolment in long term courses as well as lower percentage of private persons trained for promoting sale of data products alarming. The DoS has enumerated various measures such as issued of advertisements, deputations, interactive meetings etc., to increase enrolment in long term courses. The Committee would like to be apprised of the outcome of such measures to make good the shortfall in enrolment for various courses and any further review taken to apply more innovative corrective measures.

[Sl. No. 20, Para 21 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Due to various measures such as issue of advertisements, deputations, interactive meetings etc., the enrolment of participants for the long term course (M. Tech/M.Sc/ PG Diploma) as well as certificate course has increased significantly. However, special courses have been organized on request and on demand basis. The comparative table is as under:

Course	2009-10	2010-11	2011-12	2012-13
Long Term (M. Tech./M. Sc./PG diploma) Courses	56	29	109	96
Certificate Courses	33	38	105	109

Vetted Comments of Audit

The Action Taken by DoS in complying with the recommendation of Central PAC such as issue of advertisements, deputations, interactive meetings etc., may be systematised by issueing executive order/instruction so that implementing divisions in NRSC/IIRS could implement the decision of DoS.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee are constrained to note that an amount to the tune of Rs. 6.38 crore was awating adjustment as outstanding work centre dues. Though the DoS reported subsequent adjustment of Rs. 0.71 crore, the Committee recommend that the DoS scrupulously follow the financial instruction to adjust outstanding advances paid to its work centres. The Committee, wihile acknowledging that certain situations may demand instant supply of data for emergency applications without payment of 100 per cent advance, desire that the Department's policy should also recognize such exigencies and incorporate appropriate institutional mechanism for a time bound recovery of outstanding dues.

[Sl. No. 21, Para 22 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Out of Rs. 6.38 crores of pending work centre advances, Rs. 65 crores have been adjusted. Action for the adjustment of remaining work centre advances to the tune of Rs. 45 crores is being taken up.

Vetted Comments of Audit

Further action taken to adjust balance work centre advance may be in intimated.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B.11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee takes serious note of the fact that 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 DoS has claimed that all efforts are being made by them to expand the user base on a continous basis by providing varieties of services through newer means like ftp based data delivery, quick turn-around-time from IMGEOs and BHUVAN portal for data visualization and services. Having regard to the dictum that increase in revenue is one of the most significant markers of financial growth of any organization, the Committee wish to impress upon the DoS not to undermine the importance of revenue generation but initiate measures

for self reliance in their financial operations. The Committee also recommend that DoS/ NRSC need to overhaul their management system to exercise better monitoring and control over their financial activities.

[Sl. No. 22, Para 23 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Subsequent to NRSC becoming a Government institution under ISRO/DoS in 2008, the emphasis is on societal good and national development. The financial operations of NRSC are being reviewed periodically both within NRSC and by the Department for improving efficiency of functioning. Efforts have already been initiated for better monitoring and control of financial activities. NRSC is systematically addressing the objectives of societal good/National development as well as commercial exploitation of the technology for optimal results. This is done both interms of data sales and value added services in addition to various unique services being provided through BHUVAN geoportal. The revenue earned by NRSC against its estimation for the years 2010-11 and 2011-12 is as under:

(Rs. in lakhs)

Year	Estimates	Actuals
2010-11	3959.50	5837.31
2011-12	2613.50	3892.22

Vetted Comments of Audit

Specific action being taken to (i) initiate measure for self relative in financial operation and (ii) for exercising better control and monitoring of financial activities may be stated.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Committee are startled to note the absence of regular and effective internal control and internal audit system in the NRSC. The Committee further finds that the DoS neither indicated the scope of internal audit nor were operational issues covered in internal audit. The DoS has informed that restructuring of Internal Audit Wing (IAW) of DoS has been taken up and some changes in the existing procedures have been envisaged such as dissolving of decentralised audit wing, establishing a centralized internal audit wing at DoS, Bangalore, preparing an audit calendar for the entire department covering all ISRO/DoS establishment, periodic training of IAW personnel and organization of entry and exit meeting at each of the centres etc. The Committee desire that this restructuring of internal audit system of NRSC be finalised and implemented expeditiously so that accounting, financial and administrative matters

in NRSC do not suffer from want of efficient and effective internal control system and the Committee apprised.

[Sl. No. 23, Para 24 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

The Internal Audit Wing at DoS is restructure *vide* Office Order No. B. 11011/6/2011-Sec. 2 dated 27.07.11 and it is now centralised at Antariksh Bhavan, Bangalore under the overall control of CCA which envisages conducting internal Audit of each centre on an annual basis and following changes in the existing system/processes/procedures are envisaged:

- An Audit Calendar is draw up for the entire department covering all DoS/ISRO Centres/Units including Autonomous Bodies. The Audit period is from May to January and the period from February to April is used for follow up and reconciliation;
- An Entry and Exit meetings is organized at each of the Centres/Units which is chaired by Controller/Director of the respective Centre/Unit with participation by Chief Controller of Accounts, DoS, Sr. Head (IA), along with the Audit team;
- Training is conducted to enhance the skills and knowledge in the area of audit to the personnel of centralised IAW; and
- An Audit Plan is drawn up to cover all the activities that have bearing on the reliability of accounts and records in all four areas of administrative system and decentralized entities like CMD etc. The Audit plan also includes setting out the objectives, defining the processes and scope of the Audit and the techniques and resources to be used by the Auditor.

Vetted Comments of Audit

The cadre control of the officials working in internal audit wing (recruitment, service matters, promotion, etc.) are continued to be under the control of Department of Space, instead of Department of Expenditure, Controller General of Accounts as is the case with Civil Ministries/Departments.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

To sum up, the Committee find that many significant deficiencies and fundamental weaknesses have resulted in under utilization of remote sensing satellites and their applications which have certainly stalled timely achievements of important national development goals with 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. The Committee observe that these shortcoming would also definitely impinge upon the nation's endeavour to be the frontrunner in remote sensing technologies, a promising tool in the struggle for sustainable development. The Committee also recognize that timely access to both archival and real time multispectral earth observation data determines the level of emergency preparedness, disaster mitigation, early, warning vulnerability assessment, adaptive responses and humanitarian relief associated with a wide array of disasters besides providing cost effective solutions to the natural resources and protection problems. The Committee, therefore, exhort the Department of Space, to take note of their considered suggestions/recommendations, as highlighted in the preceding paragraphs to overcome the deficiencies that bedevil the effective utilization of remote sensing technologies.

[Sl. No. 24, Para 25 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

Regular interactions are being held with the stakeholders for assessing their requirements and to meet them. Efforts are also being made for effective utilization of remote sensing technique for natural resources management, environmental studies and disaster management support through effective user participation. The progress of all the projects are being reviewed and monitored by EOA-MC, NNRMS Standing Committees and PC-NNRMS.

Vetted Comments of Audit

As recommended by the PAC, DoS may take concrete measures to overcome the deficiencies in the effective utilisation of remote sensing technologies by issuing executive orders and instructions for better compliance and better control and monitoring of systems.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

CHAPTER III

OBSERVATIONS/RECOMMENDATIONS WHICH THE COMMITTEE DO NOT DESIRE TO PURSUE IN VIEW OF THE REPLIES RECEIVED FROM THE GOVERNMENT

Observation/Recommendation

The Committee note with concern the huge discrepancy between the statistical figures on the revenue from the data sales from IRS Missions and Access fee/ Royalty earned through International Ground Stations furnished by DoS to the Committee and that obtained by Audit from the Principal Pay and Accounts Office of DoS. The total revenue generated in three financial years from 2008-2011 amounted to Rs. 20968 lakh as calculated from the table furnished by the DoS to the Committee whereas the Audit vetting of the aforesaid data reveals an inflation in the figure by 48.31 per cent (9770.50 lakh), with the corresponding figure furnished being Rs. 11197.50 lakh. The DoS owes and explanation to Parliament on the discrepancy within six months of the presentation of this report.

[Sl. No. 4, Para 5 of the Sixtieth Report of the Public Account Committee (15th Lok Sabha)]

Action Taken

(Rs. in lakhs)

Year	Access Fee & Royalty			Data Products	
	Antrix Sales Ledger	Payable to DoS	Paid to DoS	NRSC Sales Ledger	Received by DoS
2008-09	5040.00	2451.53	2600.00	3890.00	0.00
2009-10	2969.00	1208.22	0.00	2278.00	1809.00
2010-11	2893.00	1876.48	952.49	3898.00	5224.00
Total	10902.00	5536.23	3552.49	10066.00	7033.00

It may be noted from the above table that the actual Access Fee and Royalty for the period 2008-2011 is 10902.00 lakhs and Data Sales is 10066.00 lakhs totalling to 20968.00 lakhs as provided to audit earlier. The Sales Ledger figures furnished by both Antrix and NRSC is on accrual basis. However, marketing service charges are deducted on access fee and royalty by Antrix and only the balance amount is payable to DoS. Hence, for the period 2008-2011 an amount of Rs. 5536.23 lakhs only is payble by Antrix against which a sum of 3552.49 lakh has been remitted during the above mentioned period and 388.47 lakhs has been remitted during 2011-2012, and on realization of the remaining, amount, the same will be transferred to DoS.

In respect of data products, the receipt for the year 2008-2009 was utilized by NRSC for its operations and the remaining amount was retained by it and transferred to Government on departmentalization of NRSA into NRSC in lumpsum. A summary of the above mentioned facts is as under:

(Rs. in lakhs)

year	Sales and furnished to PAC	Payable by Antrix to DoS	Payable by NRSC to DoS	Payable to DoS
2009-09	8930.00	2451.53	0.00	2451.53
2009-10	5247.00	1208.22	1809.00	3017.22
2010-11	6791.00	1876.48	5224.00	7100.48
Total	20968.00	5536.23	7033.00	12569.23

Hence the amount receivable for 2008-2011 is Rs. 12569.23 lakhs. An amount of 10973.96 lakhs has been received and the remaining amount will be credited to DoS on realization. The details furnished by PAO is as in the table mentioned below:

(in lakhs)

year	Access Fee and Royalty	Data Products	Technology Transfer	Total
2008-2009	2600.00	0.00	12.00	2612.00
2009-2010	0.00	1809.00	600.00	2409.00
2010-2011	952.49	5224.00	0.00	6176.49
Total	3552.49	7033.00	612.00	11197.49

It may kindly be noted that the receipts furnished by PAO as on cash basis which consists of receipts from technology transfer, etc. also. Therefore, the sales and receipt figures furnished to PAC is in order.

Vetted Comments of Audit

DoS stated that sale ledger figures which were compiled on 'accrual basis' was furnished by DoS, while Audit had compiled the information from Principal PAO office of the Department of Space, on cash basis. The amount actually realized by DoS and remitted to Government account needs to be taken for the purpose ascertaining of 'revenue realised' from the operational remote sensing satellites which would be as per the figures looked by the Pr. PAO, DoS.

Sd/-
(S. Srinivasan)
Additional Secretary

[Department of Space, O.M. No. B. 11011/7/2011 dated 05.12.2013]

Observation/Recommendation

The Standing Committee of Parliament on Department of Space, had observed in their 129th Report presented to both the Houses on 26th 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: (i) integration of Geographical Information System (GIS), Global Positioning System (GPS) and IRS technology to enhance accuracy of derived data, (ii) production and distribution of satellite data, (iii) processing of remote sensing data, (iv) using functional approach towards difficulties faced by departments for accurate interpretation of the data retrieved, (v) updating of technology at par with world standards, (vi) promotion of remote sensing applications in coordination with universities and research centres, and (vii) maintenance of national archive on remote sensing data with a view to preserving data also constantly updating it. The Committee deplore the reluctance of the DoS to set up the National Remote Sensing Coordination Committee for a variety of reasons but, apparently, the DoS have not been able to guide, implement and monitor the works of multifarious programmes and agencies in an integrated and efficient manner. Since the integration of satellite data with complimentary geospatial/ geomatics technologies such as GIS, GPS, Cartography, Photogrammetry, Digital Elevation Model (DEM) has become inevitable for enabling immediate display of intelligible, interpretable real-time data for various applications, which is in consonance with the Standing Committee's recommendation of integration of various technologies, the Committee, recommend that an integrated approach should be taken and a unified overarching Coordination Committee be constituted to obviate scope for delays and duplication, of work performed by various agencies and for their effective monitoring.

[SI. No. 9, Para 10 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

The Committee may kindly note that there is already a national level Planning Committee of National Natural Resources Management System (PC-NNRMS), an inter-ministerial Committee, chaired by Member (Science), Planning Commission, with Secretaries of the respective line department/ministries as members of the Committee.

The Committee has been providing directions for utilization of earth observation and geospatial data at national level. In the recent past the PC-NNRMS has met more frequently to address all issues related to remote sensing and technology utilization by the user-community. The 18th Meeting of PC-NNRMS was held on July 18, 2011, while 19th Meeting was held on June 26, 2012.

The PC-NNRMS is actively supported by 9 theme-oriented NNRMS Standing Committees, which are chaired by respective secretaries of Line-Department Ministries, These Standing Committees ensure proper utilization of data, avoid duplication and ensure efficient execution of projects across different line departments. Again, in the recent past all the 9 Standing Committees have been meeting and providing able guidance on the utilization of remote sensing and geospatial technologies by the respective Ministries.

Since such a mechanism already exists and is functioning well, the department feels there is no need for one more national level Coordination Committee for the same purpose.

Vetted Comments of Audit

DoS may initiate 'due process' to constitute a unified and overarching Coordination Committee to obviate scope for delays and duplication of work performed by various agencies and for their effective monitoring as recommended by Central PAC.

Sd/-
(S Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B.11011/17/2011 dated 05.12.2013]

Observation/Recommendation

The Committee are concerned to note that there were instances of relaxation of terms of payments, short realization of revenue, etc., in the projects undertaken by NRSC on behalf of ACL and other users. Audit review revealed that in four out of seven such operational projects of Antrix Corporation Ltd. (ACL), chargeable overheads were not levied resulting in under costing of these projects by ₹ 83.43 lakh and in two completed projects, NRSC did not raise demand for balance dues of ₹ 1.85 crore from ACL. The Committee find, on further examination, that no overheads were charged as no dues were apparently pending with ACL during the implementation of the projects. Apparently, there is an urgent need for prior planning and fixing of clear objectives of projects and also observing greater transparency in the execution of projects according to canons of financial propriety. The Committee, therefore, recommend that in future, the Department should not only avoid resorting to such deviations in the costing policy but should also establish sound practices in the management of their projects so as to obviate financial mismanagement.

[Sl. No.18, Para 19 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabhar)]

Action Taken

Antrix remits the entire cost as demanded by NRSC. As a part of system improvement, the Department of Space, introduced the concept of 4.5 per cent handling charges *vide* OM No. B.31012/6/2006-Sec. 3 dated 27.10.2006. Accordingly, the cost transferred to NRSC against the project conceived after the issue of the above OM includes 4.5 per cent handling charges. CARTOSAT 1 & 2 projects were conceived before the issue of the above OM, Since the last two years, Antrix remits the cost in advance before execution of the work.

Vetted Comments of Audit

Department may issue executive orders/instructions to avoid resorting to deviations such as violation of costing policy, non-collecting of overhead charges in the management of their projects so as to obviate financial mismanagement as recommended by Central PAC.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O.M. No. B.11011/7/2011 dated 05.12.2013]

CHAPTER IV

OBSERVATIONS/RECOMMENDATIONS IN RESPECT OF WHICH REPLIES OF THE GOVERNMENT HAVE NOT BEEN ACCEPTED BY THE COMMITTEE AND WHICH REQUIRE REITERATION

The Committee are surprised to find that the international market rate of high resolution satellite data was about six times more than the price of comparable IRS products. The Department's response in this regard, that IRS data available are not comparable with foreign satellite data with respect to spectral and spatial resolution hence their prices are not comparable, indicates an urgent need for further enhancement in the quality of IRS data in order to reach cutting edge compatibility in the international market. Reposing immense faith in the intellectual and technological capabilities, potential and future prospects of our space science and scientists, the Committee exhort DoS to put in place suitable mechanisms in consultation and collaboration with renowned scientists and technocrats leading to constant technological upgradation, elimination of bottlenecks and enhancement of quality and credibility of IRS data.

[SI No.11, Para 12 of the Sixtieth Report of the Public Accounts Committee (15th Lok Sabha)]

Action Taken

For International users, the rates of Indian Satellite data are on par with international rates. However, for Indian users these images are provided at a subsidised price for the purpose of public good and national development, particularly after NRSC has become a Government agency since November, 2008.

The quality of data being provided by the IRS series of satellites are on par with any other satellites. The diversified spectral, spatial, radiometric and temporal resolutions provided by IRS satellites address all aspects of resource mapping and monitoring at variousscales, Due to such diversified options available from IRS platforms, varieties of projects at National, Regional, State and local level are successfully implemented by various ministries and other user groups, The NNRMS system has got richly benefited from such unique possibilities provided by these satellite platforms.

IRS satellites are state-of-the-art in terms of technology and their capabilities to provide best quality data to the user community. There are different classes of IRS satellites providing services, ranging from coarse, medium and high spatial resolution imaging, that address specific user requirements.

The high resolution class of imaging for cartography is addressed by CARTOSAT series of satellites. Amongst such class of satellites CARTOSAT-2 has capability to provide images at less than 1m spatial resolution.

Technology-wise the capabilities demonstrated by IRS series of satellites has been one of the best in the world. For instance, the CARTOSAT-1, with its stereo

viewing and high resolution mapping capabilities has enabled 3 dimensional mapping of the country and the globe (through many international ground stations across the globe); OCEANSAT-2, with its capabilities of ocean colour monitoring and Ku band pencilbeam scatterometer data, is a unique satellite system in the world providing global data services. In addition to this, with the successful launch of MEGHATROPIQUES, a unique lndo-French joint satellite mission is a contribution to the Global Precipitation Mission which is yet another important achievement. Further, ISRO/ DoS has recently launched yet another unique satellite, RISAT-1, the RADAR imaging Satellite with Synthetic Aperture Radar (SAR) based imaging capabilities. This has registered India amongst few countries, with microwave remote sensing capabilities RISAT-1 is one of the most complex satellite missions and also the heaviest remote sensing satellite launched by PSLV C19.

During the 12th FYP, the missions that are being planned, use state-of-the-art technology, such as, very high resolution CARTOSATs with resolution of the order 0.65m and 0.25m, improved OCEANSAT with spatial multispectral bands for Sea Surface Temperature, Scatterometer, Geoimaging Satellite — GISAT (enables frequent / near-real time imaging from geosynchronous platform), ideally suited for disaster management and frequent monitoring of events on the earth surface, INSAT-3D, the improved weather and meteorological observation of next generation with Imagers and Sounders.

Hence, the Indian Remote Sensing missions are comparable with international class of satellites and the same is pursued even during the 12th FYP with state-of-the-art technology for supporting varieties of developmental activities in the country. The data from these satellites, not only serves as public good but also has potential for commercial exploitation for value added products and services. In addition, this will also address the purpose of monitoring disasters, weather forecasting, climate change and resource monitoring and planning.

Vetted Comments of Audit

The reply is silent about the action taken by the Department for setting up of mechanisms in consultation and collaboration of renowned scientists and technocrats leading to a constant technological upgradation and enhancement of quality and credibility of IRS data as recommended by the PAC.

Sd/-
(S. Srinivasan)
Additional Secretary
[Department of Space, O. M. No. B.11011/7/2011 dated 05.12.2013]

CHAPTER V

OBSERVATIONS/RECOMMENDATIONS IN RESPECT OF WHICH GOVERNMENT HAVE FURNISHED INTERIM REPLIES

-Nil-

NEW DELHI;
31 *January,* 2014
11 *Magha,* 1935 (*Saka*)

DR. MURLI MANOHAR JOSHI
Chairman,
Public Accounts Committee.

APPENDIX I

MINUTES OF THE SIXTEENTH SITTING OF THE PUBLIC ACCOUNTS COMMITTEE (2013-14) HELD ON 30th JANUARY, 2014

The Public Accounts Committee sat on Thursday, the 30th January, 2014 from 1130 hrs. to 1400 hrs. in Committee Room 'B', Parliament House Annexe, New Delhi.

PRESENT

Dr. Murli Manohar Joshi — *Chairman*

MEMBERS

Lok Sabha

2. Shri Anandrao Adsul
3. Dr. Baliram
4. Shri Sandeep Dikshit
5. Dr. M. Thambidurai
6. Shri Bhartruhari Mahtab

Rajya Sabha

7. Shri Prasanta Chatterjee
8. Shri Prakash Javadekar
9. Dr. V. Maitreyan
10. Shri N.K. Singh
11. Smt. Ambika Soni

SECRETARIAT

1. Shri Devender Singh — *Joint Secretary*
2. Shri Jaya Kumar T. — *Additional Director*
3. Shri D.R. Mohanty — *Deputy Secretary*
4. Smt. A. Jyothirmayi — *Deputy Secretary*
5. Ms. Miranda Ingudam — *Under Secretary*
6. Shri A.K. Yadav — *Under Secretary*
7. Smt. Anju Kukreja — *Under Secretary*

Representatives of the Office of the Comptroller and Auditor General of India

1.	Shri A.K. Singh	—	Dy C&AG
2.	Smt. Usha Sankar	—	Dy C&AG
3.	Shri Gautam Guha	—	Director General of Audit
4.	Smt. Ila Singh	—	Director General of Audit
5.	Shri C. Gopinathan	—	Director General of India
6.	Shri Jayant Sinha	—	Pr. Director of Audit
7.	Shri Purushottam Tiwari	—	Pr. Director of Audit
8.	Shri A.M. Bajaj	—	Pr. Director of Audit

2. At the outset, the Chairman welcomed the Members and the representatives of the Office of C&AG to the sitting of the Committee. The Chairman, then, apprised that the meeting was convened to consider and adopt nine Draft Reports (five Original and four Action Taken Reports) of the Committee. Thereafter, the Committee took up the following Draft Reports one by one for consideration:

(i) **** **** **** ****

(ii) **** **** **** ****

(iii) **** **** **** ****

(iv) **** **** **** ****

(v) **** **** **** ****

(vi) **** **** **** ****

(vii) **** **** **** ****

(viii) Draft Report on Action Taken on the 60th Report (15th Lok Sabha) on 'Activities of National Remote Sensing Centre'; and

(ix) **** **** **** ****

3. After detailed deliberations, the Draft Reports at Sl. Nos. (i), (ii) and (iii) were adopted with some modifications/amendments that are given at Annexure and the rest were adopted without any changes. The Committee also authorized the Chairman to finalise these Reports, in light of their suggestions and the factual verifications received from the Audit and present the same to the House on a date convenient to him.

4. The Chairman thanked the Members for their valuable suggestions on the consideration of the Draft Reports.

The Committee then adjourned.

****Matter does not pertain to this Report.

APPENDIX II

(*Vide* Para 5 of Introduction)

ANALYSIS OF THE ACTION TAKEN BY THE GOVERNMENT ON THE OBSERVATIONS/RECOMMENDATIONS OF THE PUBLIC ACCOUNTS COMMITTEE CONTAINED IN THEIR SIXTIETH REPORT (FIFTEENTH LOK SABHA)

(i)	Total number of Observations/Recommendations	—	25
(ii)	Observations/Recommendations of the Committee which have been accepted by the Government: Para Nos. 1-4, 6-9, 11, 13-18, 20-25	—	Total : 21 Percentage : 84%
(iii)	Observations/Recommendations which the Committee do not desire to pursue in view of the reply of the Government: Para Nos. 5, 10 and 19	—	Total : 03 Percentage : 12%
(iv)	Observations/Recommendations in respect of which replies of the Government have not been accepted by the Committee and which require reiteration: Para No. 12	—	Total : 01 Percentage : 4%
(v)	Observations/Recommendations in respect of which the Government have furnished interim replies: -Nil-	—	Total : 0 Percentage : 0%