



## Chapter 6 Remote Sensing Application Projects

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



Remote sensing satellite data

### Responsibility of NRSC in undertaking Remote Sensing Application Projects

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

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

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



### Projects undertaken by NRSC

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

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

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

- (i) Study on Command Area Development.
- (ii) National Wasteland Mapping.
- (iii) Rajiv Gandhi National Drinking Water Mission.

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

- (i) Village Resource Centre Programme.
- (ii) Disaster Management Support Programme.

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

### Study on Command Area Development

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

<sup>35</sup> West Bengal, Andhra Pradesh, Rajasthan, Assam and Maharashtra.



### National Wasteland Mapping

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

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

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

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

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

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

**Rajiv Gandhi  
National Drinking  
Water Mission**

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

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

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

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

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

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

<sup>36</sup> Now Ministry of Rural Development (MoRD).

<sup>37</sup> Maps prepared after the study of physical features of the surface of the earth and their relation to its geological structures.

<sup>38</sup> Andhra Pradesh, Karnataka, Kerala, Chattisgarh, Madhya Pradesh, Rajasthan, Jharkhand, Gujarat, Himachal Pradesh and Orissa.

<sup>39</sup> 90 *per cent* of the identified drinking water sources could yield water by digging wells.

**Village Resources Centre**

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

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

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

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

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

**Disaster Management Support Programme (DMSP)**

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

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

<sup>40</sup> Services like education, healthcare, weather, land & water resource management, mitigation of impact of natural disasters etc.

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

<sup>42</sup> Expert centres are Non Government Organisations (NGOs) appointed by regional coordinators to run programme for VRCs.

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



## Operational Projects for ACL

### Costing of projects

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

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

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

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

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

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

**6.3.1** In four<sup>44</sup> out of seven projects, chargeable overheads were not levied resulting in under-costing of these projects by ₹ 83.43 lakh.

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

**Dues from ACL**

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

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

**Other operational projects**

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

**Delays in completion**

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

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

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

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

**Outstanding dues**

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

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

**Wasteful expenditure**

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

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

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

**Blocking of public funds**

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

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

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





and 209 (5)<sup>50</sup> of General Financial Rules (GFRs) and indicative of inadequate monitoring of utilisation of funds, delay in project implementation etc.

DOS replied that audit observation was noted.

#### Undercosting of projects

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

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

#### Projects without MoU

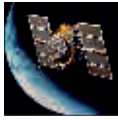
**6.4.6** NRSC took up a project for aerial photography related deliverables of seven districts of Madhya Pradesh for M/s Air Survey Company of India Private Limited, Kolkata in April 2001. Though all the deliverables were supplied by March 2002, ₹ 83.43 lakh being the amount due from the user was not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

#### Conclusion

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

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

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



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

