CHAPTER – V

Ministry of Earth Sciences

5.1 National Data Buoy Project

National Institute of Ocean Technology achieved limited success in achieving the objective of indigenising technology for production and deployment of buoys in the ocean even after 12 years of implementation. Low cost meteorological buoys developed indigenously to supplement the buoy project were not being used for intended purpose. Attempts to establish communication through Indian satellite remained at the trial stage as of July 2014. A dedicated vessel procured for deployment of data buoys was barely used for intended purpose.

5.1.1 Introduction

National Institute of Ocean Technology, Chennai (NIOT) is an autonomous institute under Ministry of Earth Sciences (formerly known as Department of Ocean Development), which was established in November 1993 with the objective of developing technologies and their applications for sustainable utilisation of ocean resources.

Department of Ocean Development (DOD) proposed (July 1996) to establish a National Data Buoy System for carrying out basic research and developmental activities in ocean. NIOT was entrusted with the responsibility for implementation of the programme.

The project envisaged deployment of 12 data buoys[34] in ocean over three years for collection of time-series data on various meteorological and oceanographic parameters in the EEZ[35] waters of India. Buoys were to be equipped with sensors for measurement of parameters viz. wind, wave, current, atmospheric pressure and temperature, sea surface temperature,

Data buoy in sea

[34] Data Buoys are floating platforms fitted with meteorological and oceanographic sensors which are moored at specific locations in the ocean to observe ocean data at regular intervals.

[35] Exclusive Economic Zone

etc. Data from the buoys was to be transmitted to shore stations through satellite and subsequently used as reliable data for developmental works in coastal and ocean areas and also to improve the predictive capability of ocean weather and climate. A Norwegian company, Oceanor was identified to supply and deploy the data buoys.

Expenditure Finance Committee of DOD approved (December 1996) the project at a cost of ₹37 crore with partial financial assistance of ₹14 crore from Norwegian Agency for Development Cooperation (NORAD) for six years. A Steering Committee under chairmanship of Secretary, DOD was constituted for proper monitoring and implementation of the project.

Initially, it was proposed to import a set of 15[36] buoys, with a view to subsequently develop an indigenous capability for design and development of data buoys.

5.1.2 Audit findings

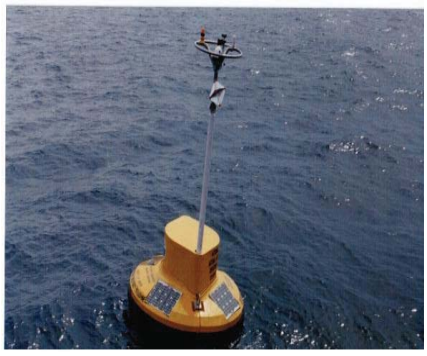
Audit observed that the objective of indigenisation of data buoys was partially achieved even after 12 years of commencement of the indigenisation process. Audit findings are discussed in the succeeding paragraphs.

5.1.2.1 Partial achievement of indigenisation of data buoys

DOD entered (December 1996) into an agreement with Norwegian firm Oceanor for supply, installation, operation and maintenance of the National Data Buoy system at a cost of NOK 34,807,000 (₹18.55 crore) for two years. At the end of two years period, Oceanor was required to operate and maintain the buoy system for one more year.

Oceanor deployed 12 data buoys in Indian waters between December 1996 and February 1998. On completion of the collaboration, Oceanor exited from the project (October 2000).

Subsequently, NIOT began the process of development of indigenous buoy technology as a separate project, based on experience gained during the implementation of collaborative project. NIOT proposed to indigenise all mechanical, electronic and mooring



First indigenised buoy

[36] 12 buoys for deployment in the ocean and three as spare.

system of buoy including satellite communication using Indian satellite (INSAT), except sensors which were planned to be imported. The scheme aimed at fabrication of 12 buoys and their deployment at various locations. Standing Finance Committee of DOD approved (December 2000) the project at a cost of ₹8.81 crore with duration of two years, against which expenditure of ₹84 lakh was incurred. However, the indigenisation activities were subsequently continued in the Tenth and Eleventh Plan periods, during which it was also decided to augment the buoy network in the ocean to 40 data buoys. NIOT incurred expenditure of ₹100.28 crore towards continuation of the project on maintenance of data buoy network upto 2012.

During 2000 to 2006, NIOT indigenised mechanical systems and assembled, integrated and deployed buoys in the Indian Ocean. In order to combat the problem of vandalism of buoys, NIOT also developed tamper proof design with components such as protective hood, covered solar panels and hard fasteners in the lids. However, due to technical problems and malfunction of some components, many buoys failed to transmit data. During Tenth plan period, out of 26 buoys deployed, only 19 were operational (March 2007) at any point of time. Similarly, during Eleventh Plan period also, the Institute could deploy only 34 buoys, of which the number of functional buoys did not exceed 19 at any point of time.

A failure analysis conducted (2008) on indigenously developed buoys showed that data gaps ranged from 65 to 91 *per cent* for buoys deployed in the Bay of Bengal and 28 to 73 *per cent* for buoys deployed in the Arabian Sea. The reasons for failure were attributed to drainage of battery, buoy damage due to vandalism, problem in Central Processing Unit (CPU) and lacuna in the communication system developed under indigenisation. The failure analysis also clearly brought out that performance of buoys supplied by Oceanor was better when compared with indigenously integrated buoys. NIOT arrived at the conclusion that all problems were due to indigenisation process adopted by the Institute.

Due to logistical and other constraints experienced by NIOT, an expert committee was set up to address the problems of data gaps and look into the optimum buoy requirement. The committee recommended (March 2009) that optimum number of 12 buoys were required. The committee further recommended that a totally new buoy system equipped with more number of sensors and different mooring line be procured as one unit.

Accordingly, NIOT placed (June 2010/March 2012) purchase order with Oceanor for import of 16 OMNI buoys[37]. Between June 2010 and March 2013, NIOT received 16 buoys after incurring expenditure of ₹27.21 crore. In addition, NIOT also imported various mechanical and electrical buoy components and mooring worth ₹1.96 crore.

Thus after more than 12 years of indigenisation efforts of the data buoys project, buoy technology could not be fully stabilised. However, NIOT's adaptation of buoy design to counter vandalism and efforts to generate awareness to prevent vandalism were creditable.

MoES stated (May 2014) that NIOT had successfully developed five variants of CPU for different buoy applications and six buoys (four coastal buoys[38], one meteorological ocean buoy[39] and one tsunami buoy[40]) were working with the indigenised technology. MoES however, accepted that indigenisation of entire data buoy system will require specific time period for development. MoES further stated (May 2014) that new system was imported as a complete package since scientific requirement demanded newer buoy design with subsurface sensors, induction mooring, etc., capable of generating various meteorological and oceanographic parameters. MoES added (July 2014) that the next phase of indigenisation of buoys for sub-surface parameters had been commenced and tested.

The reply indicates that indigenisation of technology for buoy system as a whole was yet to be fully developed. Further the reply was silent on the timeline required for completing the indigenisation process. Thus, though NIOT made efforts to indigenise buoy technology for over 12 years and incurred expenditure of ₹100.28 crore on the project, it had achieved partial success in deployment and utilisation of indigenously developed buoys.

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[37] OMNI buoys are moored buoys similar to data buoys but are more advanced buoys having the capability to measure ocean current, conductivity and temperature up to 500m depth. In addition, these buoys are also equipped with radiation sensors and rain gauges.

[38] These buoys are equipped with meteorological and oceanographic sensors along with water quality sensors and are deployed in coastal waters.

[39] These buoys carry sensors to measure wind speed and direction, atmospheric pressure, air temperature, humidity, conductivity, sea surface temperature, current speed and direction and wave parameters.

[40] The Tsunami buoy system consists of two units, a surface buoy and a Bottom Pressure Recorder. BPR measures the pressure every 15 seconds and communicates it to the surface buoy every hour.

5.1.2.2 Establishing communication link using INSAT

As an important component of the National Data Buoy project, DOD proposed (July 1996) to establish a communication link between buoys in sea and shore station using Indian satellite INSAT-2B. This was primarily to avoid expenditure in foreign exchange due to usage of foreign satellite and for reasons of security. However, as per agreement entered (December 1996) with Oceanor, it was agreed to use foreign satellite 'INMARSAT' initially as it was considered to fit with the time schedule of the project.

NIOT prepared (2001) technical feasibility report in association with Space Application Centre[41], Ahmedabad (SAC) and subsequently developed (December 2002) two prototype systems with indigenous technology for buoy communication. Although one prototype system was deployed (December 2002) and INSAT communication was established, there were issues in continuity of transmission due to problems in interfacing of transceivers with Data Acquisition System. Considering the need and importance of utilisation of domestic satellite, Monitoring Committee in its meeting (January 2008), fixed a deadline of May 2008 for switching over to INSAT communication system. The problem of continuous transmission, however, was not resolved and NIOT continued to utilise foreign satellite. Further, the transmitters developed by NIOT could not be utilised for the imported OMNI buoys, which handled larger quantity of data sets to be transmitted.

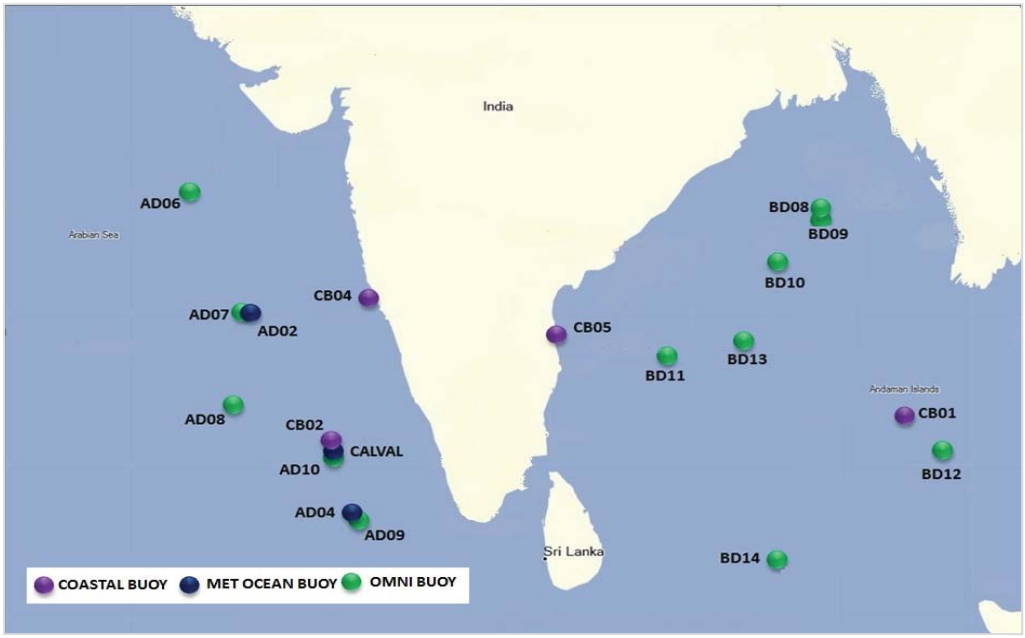
As of July 2014, NIOT was able to install four indigenously developed coastal buoys with INSAT communication system. However, development of communication technology in deep sea buoys was still under process.

MoES stated (July 2014) that certain technological limitations such as lack of two way communications were being taken up with ISRO[42].

The fact remained that as of July 2014 efforts of NIOT to establish communication through Indian satellite were still in the development and testing stage.

[41] A unit of Department of Space

[42] Indian Space Research Organisation



Network of buoys in Indian seas

5.1.2.3 Unfruitful expenditure in development of low cost meteorological buoys

To supplement the existing data buoy network and to support IMD's requirement of larger buoy network, NIOT proposed to undertake a project for development and production of low cost meteorological buoys. The project aimed at design, development and production of 50 low cost data buoys and their deployment at selected locations in seas around India to acquire basic meteorological data from atleast 50 locations in the sea, to support the existing data buoys in case of failure. MoES sanctioned (October 2006) the project at a total cost of ₹4.80 crore for a duration of one year.

Spar type low cost buoy

NIOT made two attempts till December 2007 to design and fabricate the buoys but failed as one buoy was damaged during deployment and another buoy worked only for a week. NIOT decided (January 2008) to make another attempt with a new design and to deploy 25 such buoys by June 2008. However, NIOT developed only two buoys with the new design and upon deployment (March 2008) these buoys transmitted data only for a month.

NIOT found that material used in preparation of buoys was not able to sustain in the harsh sea condition and therefore, decided (February 2009) to

use High Density Poly Ethylene (HDPE) instead. Project duration was extended till March 2010 to facilitate designing of buoys and conducting field trials. However, new buoys were also found to be unsuccessful during field trials (July 2010) and it was decided not to use these buoys in ocean observation. Expenditure of ₹4.08 crore was incurred on the project.

Audit observed that components for the buoy, including sensors were purchased for all 50 buoys even before fabrication of prototype buoy and conduct of sea trials to ascertain their stability and successful integration, which was imprudent.

NIOT stated (February 2011) that in view of difficulties in sustaining the system in sea, it was decided to install them on coastal ships. NIOT further stated (September 2013) that considering original project duration of one year and that items were required to be imported with long delivery time, components were purchased together. MoES added (May 2014) that 17 buoys were developed of which five were installed in ships, seven would be installed in locations identified in South India and the remaining buoys would be used as spares.

The fact remained that utilisation of buoys in ships was a sub-optimal solution and the buoys were not utilised for the intended purpose of obtaining uninterrupted ocean data which resulted in unfruitful expenditure of ₹4.08 crore and non-achievement of intended objective.

5.1.2.4 Utilisation of buoy tender vessel Sagar Manjusha

In the second Steering Committee meeting (May 1999) NIOT stressed the need for acquiring a dedicated vessel exclusively for deployment of buoys. NIOT reiterated this in the meeting held in May 2002 and acknowledged that programme suffered for want of suitable vessel to carry out planned maintenance of buoys. It was assessed that total demand for vessel for various ocean observation related programmes would be 310 days in a year, of which requirement for data buoy project alone was estimated at 180 days. The remaining 130 days were planned to be utilised for other ocean observation related programmes. The committee agreed to have a dedicated vessel for deployment of buoys.

DOD sanctioned (October 2003) acquisition of the vessel at a total cost of ₹23 crore. Accordingly NIOT gave (April 2004) the contract for building the ship to Hindustan Shipyard Ltd. The ship named Sagar Manjusha was built at an actual cost of ₹22.50 crore and inducted (June 2006) into NIOT service.

Sagar Manjusha

On being put into use, the vessel was found to have excessive rolling[43]. The instability of Sagar Manjusha limited its utilisation for ocean observation work. During the period 2006 to 2010, of the planned 1,240[44] days for ocean observation related programmes, the vessel was used for 114 days. Of these 114 days, only 74 days were spent in buoy deployment and retrieval work. During 2010, NIOT introduced imported OMNI buoys, which had a special induction mooring system that required vessel having dynamic positioning system, due to which it was not possible to use Sagar Manjusha. Thus, utilisation of the dedicated vessel, procured exclusively for national data buoy project at cost of ₹22.50 crore, for intended purpose was minimal.

Though an expert committee was constituted to assess the problem of excessive rolling and to conduct performance evaluation of the vessel for various programmes of the institute, the committee did not extend their time to carry out studies on the issue. Subsequently, NIOT approached (August 2009) Indian Maritime University (IMU) seeking their advice for design modification and alteration for improving sea keeping qualities of the vessel and placed (August 2010) a work order on IMU at a cost of ₹9.50 lakh for carrying out analysis, suggesting modifications and preparation of drawings. The suggestions of IMU received in February 2012, were subsequently implemented by NIOT.

MoES stated (May 2014) that in view of spurt in scientific requirements, the vessel was equipped with various laboratories and survey equipment in last few years to make it multi-purpose vessel and utilised for various research purposes.

The reply is to be viewed in the context that Sagar Manjusha, since its deployment, could barely be used for the intended purpose between 2006 and 2010. With the changes in design of the data buoys in 2010, its utilisation for the primary purpose was further limited. In addition, total utilisation of Sagar Manjusha during 2006 to 2013 on ocean observation programmes as well as for other purposes was only to the extent of 53[45] *per cent* of the assessed requirement.

[43] Rocking of a floating vessel caused by waves or other external forces.

[44] 310 days per year for four years from 2006-07 to 2009-10.

[45] 1,151 days out of 2,170 days, being assessed requirement for ocean observation programmes at the rate of 310 days per year for seven years from 2006-07 to 2012-13.

5.1.3 Conclusion

Though NIOT made efforts to indigenise buoy technology for over 12 years and incurred expenditure of ₹100.28 crore on the project, it had achieved partial success in deployment and utilisation of indigenously developed buoys with INSAT communication. Another related project undertaken by NIOT for development of 50 low cost buoys in a year to generate meteorological data was also not successful as it failed to deploy required number of buoys for the intended purpose resulting into unfruitful expenditure of ₹4.08 crore. The vessel procured exclusively for deployment of buoys at a cost of ₹22.50 crore was also not utilised optimally for intended purpose.

5.2 Irregular payment of gratuity

Ministry of Earth Sciences irregularly permitted its autonomous bodies to change the service conditions of their regular employees from those envisaged under the provisions of CCS Pension Rules, 1972 to The Payment of Gratuity Act, 1972. Based on this permission, National Institute of Ocean Technology, Chennai paid gratuity of ₹68.88 lakh to 54 regular employees who had resigned from service, with retrospective effect.

As per Rule 50 of the CCS Pension Rules, 1972, government employees after completing five years of qualifying service become eligible for receiving retirement gratuity. However, resignation from service entails forfeiture of past service.

The Payment of Gratuity Act, 1972 provides for a scheme for payment of gratuity to employees engaged in factories, mines, oilfields, plantations, ports, railway companies, shops or other establishments. As per Section 4 of the Act, gratuity is payable to an employee on termination of employment after rendering continuous service for not less than five years on superannuation, retirement, resignation or death.

However, Government of India's Decision (6) (2) under Rule 50 of CCS Pension Rules, 1972 stipulates that employees who opt for Contributory Provident Fund (CPF) scheme are entitled to retirement gratuity and death gratuity as admissible to government servants borne on pensionable establishment. Therefore, under CCS Pension Rules, 1972, those employees who resign from service would not be eligible to receive gratuity, whereas under The Payment of Gratuity Act, 1972, employees who resign after rendering continuous service for not less than five years were eligible for payment of gratuity.

National Institute of Ocean Technology, Chennai (NIOT) is an autonomous body under administrative control of Ministry of Earth Sciences (MoES). The Staff Service Rules of NIOT stipulated that regular staff would be governed by CCS Pension Rules, 1972 for the purpose of payment of gratuity and contract staff would be covered under The Payment of Gratuity Act, 1972.

As above provisions placed regular staff of NIOT in a disadvantageous position as compared to contract staff, NIOT placed (August 2008) a proposal before its Governing Council (GC) to amend the Staff Service Rules so as to bring staff appointed on regular basis also under the ambit of The Payment of Gratuity Act, 1972 retrospectively from September 2000. GC approved (January 2010) the proposal for making provisions of the Payment of Gratuity Act, 1972 applicable to all regular employees of NIOT. Accordingly, NIOT paid an amount of ₹68.88 lakh to 54 regular staff who had resigned from service between 2001 and 2013 and who were otherwise not eligible for gratuity under CCS Pension Rules, 1972.

Audit scrutiny revealed that MoES permitted (June 2009) its autonomous bodies to follow guidelines for payment of gratuity to their regular employees as per The Payment of Gratuity Act, 1972 and also issued (June 2009) an order stating that autonomous institutes under the Ministry were being governed by provisions of Gratuity Act, 1972 in respect of regular employees of the institutes. This was in contravention to the provisions of CCS Pension Rules, 1972, as regular employees under CPF scheme were covered under CCS Pension Rules, 1972 for the purpose of payment of gratuity. It was also against the standards of financial propriety[46] and Rule 209 (6) (iv) (a)[47] of General Financial Rules.

Audit further observed that MoES did not obtain approval of Ministry of Finance for changing the service conditions of regular employees of its autonomous bodies from provisions of CCS Pension Rules, 1972 to The

[46] Rule 21 of General Financial Rules on standards of financial propriety states that expenditure from public moneys should not be incurred for the benefit of a particular person or a section of the people, unless a claim for the amount could be enforced in a Court of Law or the expenditure is in pursuance of a recognised policy or custom.

[47] Rule 209 (6) (iv) (a) states that all grantee institutions or organisations which receive more than fifty *per cent* of their recurring expenditure in the form of grants-in-aid, should ordinarily formulate terms and conditions of service of their employees which are, by and large, not higher than those applicable to similar categories of employees in Central Government. In exceptional cases, relaxation may be made in consultation with Ministry of Finance.

Payment of Gratuity Act, 1972. This was in violation of the instructions[48] of Ministry of Finance and provisions of General Financial Rules.

Changing the service conditions of employees of autonomous bodies of MoES with retrospective effect without obtaining approval of Ministry of Finance resulted in irregular payment of ₹68.88 lakh towards gratuity to regular staff of NIOT who had resigned from service.

NIOT stated (April 2013) that based on approval of the GC and office memorandum issued in June 2009 by MoES, the Act was adopted by the Institute and made applicable to eligible employees. Accepting the audit observation, NIOT further stated (June 2014) that action taken by NIOT was a one time measure and that relevant provisions of CCS Pension Rules, 1972 would be observed in future for the purpose of gratuity in case of those employees who were covered under CPF scheme.

The reply may be viewed in the light of the fact that payment of gratuity to regular employees who resigned from service was against the governing provisions of CCS Pension Rules, 1972. Further, any proposal pertaining to employment structure involving financial implications required prior approval of Ministry of Finance, which was not obtained.

The matter was referred to Ministry in March 2014, its reply was awaited as of July 2014.

[48] With a view to ensure that provisions relating to powers of Governing Bodies of autonomous bodies in such matters having financial implications are properly exercised, Government of India, Ministry of Finance, Department of Expenditure instructed (October 1984) all Ministries of autonomous bodies to incorporate in relevant Rules/Bye-laws/Regulations that proposals relating to employment structure would need prior approval of the Government of India (i.e. Department of Personnel and Training) in consultation with Ministry of Finance, Department of Expenditure.