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MANAGEMENT OF PROJECTS RELATING TO UTILISATION AND CONSERVATION OF SOIL AND WATER UNDERTAKEN BY INSTITUTES OF ICAR

MINISTRY OF AGRICULTURE (DEPARTMENT OF AGRICULTURAL RESEARCH AND EDUCATION)

PUBLIC ACCOUNTS COMMITTEE 2006-07

FORTIETH REPORT

FOURTEENTH LOK SABHA

LOK SABHA SECRETARIAT
NEW DELHI

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Presented to Lok Sabha on.....
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LOK SABHA SECRETARIAT
NEW DELHI

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INTRODUCTION

I, the Chairman, Public Accounts Committee, as authorised by the Committee, do present this Fortieth Report relating to "Management of Projects relating to Utilisation and Conservation of Soil and Water undertaken by Institutes of ICAR" on Chapter-II of Report of C&AG of India for the year ended 31 March, 2004 (No. 5 of 2005), Union Government (Scientific Departments).

2. The Report of the C&AG of India for the year ended 31 March, 2004 (No. 5 of 2005), Union Government (Scientific Departments) was laid on the Table of the House on 6th May, 2005.

3. The Committee took the evidence of the representatives of the Ministry of Agriculture (Department of Agricultural Research and Education) and Indian Council of Agricultural Research on the subject at their sitting held on 5th January, 2006. The Committee considered and finalised this Report at their sitting held on 13th February, 2007. Minutes of the sitting form Part-II of the Report.

4. 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 and have also been reproduced in a consolidated form in Appendix to the Report.

5. The Committee would like to express their thanks to the Officers of the Ministry of Agriculture (Department of Agricultural Research and Education) and Indian Council of Agricultural Research for the cooperation extended by them in furnishing information and tendering evidence before the Committee.

6. 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.

PROF. VIJAY KUMAR MALHOTRA,
Chairman,
Public Accounts Committee.

NEW DELHI;
15 *February,* 2007
26 *Magha*, 1928 (*Saka*)

REPORT

Introductory

1. Natural Resource Management Division of Indian Council of Agricultural Research (ICAR) is responsible for research on conservation, improvement and efficient utilisation of soil and water. Five research institutes of ICAR are engaged in research in these areas and the areas of research undertaken by them are as under:—

Sl. No.	Name of Institute	Research areas
1.	National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), Nagpur	Soil survey and mapping the soils of the country to promote scientific and optimal land pedology, soil survey, land evaluation and land use planning.
2.	Indian Institute of Soil Science (IISS), Bhopal	Basic and strategic research on soils, especially physical, chemical and biological processes related to management of nutrients, water and energy and developing advanced technologies for sustainable systems of input management in soils.
3.	Central Soil Salinity Research Institute (CSSRI), Karnal	Basic and applied research for developing strategies for salinity control, reclamation and management of salt affected soils.
4.	Water Technology Centre for Eastern Region (WTCER), Bhubaneshwar	Basic and applied research for developing strategies for efficient utilisation of on-farm water resources to enhance agricultural productivity on sustainable basis.
5.	Central Soil & Water Conservation Research and Training Institute (CSWCR&TI), Dehradun	Research and development of strategies for controlling land degradation under all primary production systems, rehabilitation of degraded lands, updated technology in soil and water conservation, watershed development and its management and undertaking water harvesting measures.

2. This Report is based on Chapter II of the Report of C&AG for the year ended March, 2004 No. 5 of 2005, Union Government (Scientific Departments) relating to "Management of projects relating to utilisation and conservation of soil and water undertaken by Institutes of ICAR". Audit undertook a review covering the period 1999-2000 to 2003-2004 of the management of the projects undertaken to utilise and conserve soil and water through test check of in-house projects, sponsored projects and externally aided projects undertaken and completed by the aforesaid five institutes with reference to the milestones and achievements of objectives and benefits to be derived from them.

3. According to Audit Report, (i) NBSS&LUP, Nagpur could not achieve objectives of soil survey, mapping and land use planning in three projects involving an expenditure of Rs. 6.63 crore. Soil Survey reports were not prepared even after lapse

of five to twenty-five years; (ii) IISS, Bhopal did not achieve the desired results in soil science research in two projects, despite expenditure of Rs. 55.25 lakh; (iii) CSSRI, Karnal could not solve effectively the issues relating to reclamation and management of alkaline and saline soils in two projects costing Rs. 12.82 crore. Map of salt affected soils of India was also not prepared; (iv) In water management research, WTCER, Bhubaneshwar failed to accomplish targeted results in three projects costing Rs. 36.39 lakh resulting in non-achievement of the objective of sustainable agricultural production through management of canal water, rain water and waterlogged land; (v) CSWCR&TI, Dehradun did not achieve the objectives of research in soil and water conservation measures and land use systems for sustainable crop production in three projects costing Rs. 37.90 lakh; and (vi) Technologies developed in 16 projects at a cost of Rs. 2.44 crore were not transferred to end users.

Some of the important aspects of Audit findings are dealt with in the following paragraphs.

I. *National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), Nagpur*

4. The aims and objectives of the Institute are as follows:—

(i) Soil survey and mapping of the soils of the country to promote scientific and optimal land use in collaboration with relevant institutions and agencies.

(ii) Research in the areas of Pedology, Soil Survey, Land Evaluation and Land Use Planning.

(iii) Training, education and promotion of awareness on the soil resources and its state of health.

Non-achievement of Objectives:

5. Audit para points out that in respect of three projects undertaken by NBSS&LUP, the objectives were achieved partially and the delay in completion had ranged from three months to seven years. The details of these projects are given as under:

"(a) In collaboration with CSSRI, Karnal, NBSS&LUP undertook a project in May 1996 on "Preparation of soil resource inventory of coastal salt affected areas of West Bengal and Orissa using satellite imagery and characterization and classification of the soil to determine their potentialities, problems and management" at an outlay of Rs. 16 lakh for a period of two years.

However, the project was continued even after the stipulated duration of two years. SRC recommended in November 2000 to complete the project by 2001. Ignoring the advice of SRC, the project was continued as of July 2004. The annual progress reports of the project were not prepared regularly. In the annual progress report for 2002-03, it was mentioned that due to pressure of other projects, the work of this project could not progress as per the schedule and the likely date of completion was determined as December 2005. ICAR stated in December 2004 that extension of the project upto December 2005 was accepted

by SRC and added that the work was in progress and would be completed. ICAR did not, however, indicate the remedial measures instituted to address the delays.

(b) NBSS&LUP, Nagpur undertook a project on "Identification, characterization and delineation of agro-economic constraints of oilseed based production systems in rainfed eco system" from July 2000 to February 2003 at an estimated cost of Rs. 55.41 lakh. The project was to facilitate identification of the appropriate sowing time for specified areas and suggest strategies for improving the productivity of rainfed oilseed crops. The rainfed oilseed based production zones were to be delineated using Geographical Information System (GIS).

The final report of the project revealed that studies were conducted for four crops in 16 districts as against the target of six crops in 19 districts. Further, data on area and production of oilseeds were collected only in six districts as against 28 different districts targeted. Even in the 16 districts covered, no strategies for improving the productivity of rainfed oilseed crops were suggested. The rainfed oilseed-based production zones were also not delineated using GIS. Thus, the benefits of improving the productivity of rainfed oilseeds could not be derived.

ICAR stated in December 2004 that against the target of 19 districts for six crops, 16 districts for four crops were covered as suggested by the Scientific Advisory Panel and added that the data collected was processed to generate maps depicting the oil seed production potential and constraints and were presented in different thematic maps. However, it did not furnish the reasons for collection of data only in six districts as against 28 districts as per the project proposal.

(c) ICAR sanctioned a project on "Land use Planning for management of agricultural resources" from January 2001 to December 2003 at a cost of Rs. 9.32 crore. The project aimed at developing the strategies and options for rational and scientific land use plan at watershed level.

The project was extended up to December 2004. The progress reports of the project up to March 2004 revealed that due to delay in receipt of funds, activities like procurement of equipment, socio-economic survey, resource survey, different kinds of mapping and crop experiment could not be completed as planned. The economic analysis of alternate land uses to assess overall socio-economic aspect was not started as of July 2004. Linkages with various organizations like International Crop Research Institute for Semi Arid Tropics and CSSRI on various aspects such as fixh varieties for coastal areas, animal component suitable for coastal eco-system and technologies for different crop components of land use models for coastal eco-system were yet to be developed. Further, field experiments for cereals and pulses crops, development of soil site suitability for different land use types, selection of suitable cropping system specific to each agro-ecological zone and monitoring of soil and water qualities were yet to be completed to achieve the aim of the project. Against the allocation of Rs. 9.32 crore, only Rs. 5.92 crore was spent as of March 2004.

ICAR stated in December 2004 that the work had already been started to conduct economic analysis and alternate land uses to assess overall socio-economic aspect and that activities were also simultaneously initiated to assess the data for horticultural validation, development of soil site suitability criteria, suggesting different crop/cropping sequence in specific agro-ecozone. However, the reply is silent about the linkages to be developed with other institutes as envisaged in the project".

6. Explaining the reasons for non-achievement of objectives by NBSS&LUP, the Ministry have stated in a note as under:—

"(a) The proposal of the project 'Preparation of soil resource inventory of coastal salt affected areas of West Bengal and Orissa using satellite imagery and characterization and classification of the soil to determine their potentialities, problems and management' was submitted in 1996 but actually approved in 1999 after the required review. It was envisaged to be completed by 2003 as discussed in the SRC. The work on the Project could not be fully geared up due to priority work of NATP. The project was again discussed in SRC 2004 and recommended for extension upto December, 2005. However, requisite Satellite Data has been received from National Remote Sensing Agency (NRSA), Hyderabad, only in August, 2005. The data is being analyzed and then to be validated in the field, which may take around 12 months period and it is expected to complete the project by December, 2006. The instructions have been issued to all the scientists to adhere strictly to the time schedules of the Projects. The progress is being monitored on six monthly basis.

(b) The Project proposal on "Identification, characterization and delineation of agro-economic constraints of oilseed based production systems in rainfed eco-system" initially envisaged the work on six crops in 28 districts. However, Scientific Advisory Panel (SAP) of National Agricultural Technology Project recommended studies on only four crops *viz.* Groundnut, Soyabean, Rapseed/ Mustard and Sesamum in 16 districts. This revised target fixed by SAP was commensurate with the amount sanctioned for the project. The final report has been submitted. The constraints in production system for rain-fed oil seed crops were identified and oil seed based production zones were delineated using GIS system. The necessary maps on production potentials and contraints of the rain-fed eco-region were prepared. The outputs would be useful for suggesting appropriate strategies for improving the productivity of oil seed based rain-fed eco-system.

(c) The progress of the project "Land use planning for management of agricultural resources" was delayed due to non-receipt of funds in time. After receipt of the funds in August, 2004, economic analysis was initiated and completed by December, 2004. The linkages have also been built-up with ICRISAT, CSSRI, State Departments of Animal Husbandry and Fisheries to have assessment of Coastal Ecosystem, Fish Culture and Animal Components etc. The field experiments for cereals and pulse crops, soil site suitability for different land use types and selection of cropping systems specific to each agro-ecological zone were done. Against the allocation of Rs. 9.23 crores only Rs. 5.92 crores were spent. This NATP Project has been completed and report submitted."

7. Explaining the position in this regard, the Secretary (Ministry of Agriculture) stated during Evidence as under:—

> "As far as Nagpur is concerned, partial achievements in 13 projects has been reported by Audit, which comes to less than 5 per cent. There were total 267 projects and out of that 13 cases of partial achievements were reported. That is less than 5 per cent. As far as paras pertaining to NATP project are concerned where socio-economic study is referred to, was not done, I am to submit that has now been done and the work has been completed."

Improper Maintenance of Project Files

8. According to Audit project files in respect of research projects were not properly maintained by NBSS&LUP. The Institute had completed 45 projects and terminated 15 projects before their completion during 1999-2004. Of the completed projects, research project files were available for 19 projects only which were examined in audit.

9. In accordance with the byelaws, rules and regulations of ICAR and instructions issued by ICAR from time to time, research project files (RPFs) are required to be maintained in three parts. The research project proposal is to be kept in RPF-I, which is to be presented to Staff Research Council (SRC) for approval. Annual progress of each project is to be kept in RPF-II, for review by SRC to evaluate the implementation of the project. The final report in the form of RPF-III is required to be prepared and presented to SRC and Research Advisory Committee (RAC) for overall review and evaluation of the project. According to Audit, NBSS&LUP did not maintain the RPFs properly in respect of the projects implemented during 1999-2004. In case of 15 projects, which were dropped midway, RPF-I only were available. As such reasons for termination of the projects before their completion were not ascertainable. Besides, no records were maintained for 10 completed projects. In 16 projects, RPFs were maintained intermittently. In the absence of proper maintenance of RPFs, effectiveness of monitoring of research activities by SRC/RAC cannot be ensured.

10. When asked about the reasons for non-maintenance of RPFs, by the Institute, the Ministry stated in a note as under:—

> "Consequent to the discontinuation of the Assessment system being followed earlier, there was some laxity on the part of the individuals. Hence, the submission of RPFs was erratic and got delayed. In some cases, the concerned project investigators (handling particular project) were deployed for other priority work where their involvement was felt most essential such as NATP work. These principal investigators could not make noticeable progress in their regular projects and hence RPF-II was not prepared.".

11. On being asked as to when and for what purpose the concerned project investigators were deployed, the Ministry in a note explained as under:—

> "More than 250 participants debated priority of mapping the soils at country

and State level in a workshop held during September 19—21, 1986 at Nagpur. As per recommendation the concerned project investigators were assigned priority job under mega project on Soil Resource Mapping to bring out Soil Map of the country on 1:1 m scale from 1986 to 2002. Similarly, a World Bank aided time bound project of more than Rs. 1000 crores was initiated in 1998-99 at the country level. Some of the scientists were also engaged in the prioritized NATP Project from 1998 to 2005".

12. The Committee enquired as to how ICAR was able to monitor the research activities undertaken under various projects by the Research Institutes in the absence of proper maintenance of files by them. In reply, the Ministry stated in a note as under:

"Although RPFs were not updated, scientists had information in field diaries, registers, records of labs and photographs. The research activities under projects were monitored through presentations before Scientific Research Councils, Research Advisory Committees, Quinquennial Review Teams and Annual Reports."

13. When asked whether any responsibility had been fixed on the officials responsible for poor/non-maintenance of RPFs in respect of individual projects, the Ministry in their reply stated as under:—

"The defaulting scientists have been warned on this count and issued strict instructions for not repeating such lapses in future."

14. The Committee desired to know about the measures taken for proper maintenance of RPFs in the future. In response, the Ministry have stated as under.

"Now strict instructions have been issued to submit the progress report in RPF mode. The status of completion of RPFs is being monitored regularly in SRC meetings".

15. Audit has pointed out that NBSS and LUP had completed 45 projects and terminated 15 in-house projects before their completion during 1999-2004. In this connection, the Committee sought to know the reasons due to which these projects were dropped mid-way. In response, the Ministry stated as under:

"The projects had to be temporarily dropped as the scientists executing the projects were assigned priority job in mega project on Soil Resource Mapping and World Bank aided National Agricultural Technology Project (NATP). This priority was decided by 250 scientists in a consultative process during a workshop held at Nagpur on September 19—21, 1986. Similarly, NATP (World Bank Project) was sanctioned by the competent authorities".

16. When asked whether the termination of these projects had affected the overall research activity of the Institute, the Ministry in a note replied as under:—

"The temporary suspension of these projects did not affect overall research activity and output of the Institute as the priority was reallocated for bigger cause of Soil Resource Mapping under mega and NATP projects. The Soil Resource maps at country and State levels were urgently desired for drawing up Soil Resource Use Plans at national and regional levels".

Non-submission of Survey Reports

17. One of the mandates of NBSS & LUP was to conduct soil survey and publish reports for land use planning. Audit had pointed out that twenty five field survey reports were pending for periods ranging from five to twenty-five years. It was observed that field surveys of the districts of Chittur, Mysore and Chitradurga were conducted partly in 1976 but were not completed fully. The soil survey reports had not been submitted till August 2004. As a result, the objective of land use planning was not achieved fully.

18. The Committees, expressed the view that the delay in finalisation of reports could often lead to projects losing their relevance and becoming redundant and desired to know the steps taken by ICAR to overcome these problems. In reply, the Ministry stated as under:—

> "Nature and fundamental properties of soils do not change significantly in time span of 20-30 years. It takes about 1000 years to form 2.5 cm layer of soils. Therefore, information generated under these projects still holds good and is of value. While reports were not brought out in time, some of the information was utilised in preparing maps and in other ongoing or concurrent research projects. Necessary instructions have been issued and scientists told to be vigilant in future."

19. On being asked as to why the soils survey reports were not prepared even after a lapse of five to twenty-five years, the representative of the Ministry stated during evidence as under:—

> "....in 1986 some other priority was given. Therefore, some of the reports were given second priority. It was a decision taken at the national level that we have to prepare national level plan first and the other projects, which are already initiated, can be taken up later on. The one million scale map, as he said, has already been prepared. When we prepared a national level map, then we took up those 15 projects. They were kept in abeyance due to change in priority in 1986 because the survey is a long range project. The priority of 15 projects was changed in 1986. Now, those 15 projects have also been taken up."

20. The Committee sought to know the rationale for spending money on a project when reports on these projects are not given/published even after 25 years. To this, the representative of the Ministry deposed as under:—

> "It is because the decision was taken that we have to prepares the map at different scales. One was, we have to do at one to one million scale, which is a general map which cannot be used for proper planning. They said you also prepare the map at 1:2,50,000 scale for each State. Then the map has to be prepared at Patwari scale. Now, we have given the Patwari scale also. It is because when we come to the watershed management programme, the maps were prepared at different scales. This process will further continue because new technologies have come in the agricultural field. They need more detailed analysis. So, it was a matter of change in scale. That was the main reason".

21. The witness added:—

"...to survey the country at Patwari scale it will take at least 60 to 70 years to cover this country."

22. As regards achievement of the objectives of Land Use Planning, the Ministry have stated that Atlas was sent to all districts/State authorities for implementing the suggested land use. It was also stated that interaction with district authorities was made through coordination meetings and trainings on use of soil resource data for sustainable land use.

23. When asked about the effectiveness of the measures taken by the Ministry for land use planning and whether any assessment had been made in this regard, the Ministry stated as under:—

"The district atlases have been widely acclaimed by State and district user agencies. The interaction meetings and trainings were also organized to sensitize different stake holders. As on date, no systematic impact assessment studies on the adoption of suggested land use plans by different users agencies have been made by the Bureau".

Improper Maintenance of National Register of Soil Series

24. For identification of soil series alongwith their salient characteristics and classification, a national register was required to be maintained. Indices according to States and crops raised on the soil series were also to be prepared for ready reference. However, the national register had not been updated and no information was furnished regarding the year from which the register was to be updated. To complete this task, correlation of soil series identified so far was required to be completed. Quinquenniel Review Team (QRT) had observed that there was a backlog of correlation of more than a thousand identified soil series.

25. In their reply (December 2004) to Audit, ICAR had stated that national register of soil series was temporarily suspended due to national mission project on soil resource mapping of different States on 1:2,50,000 scale and of the country on 1:1 million scale initiated in 1986. It was also stated that State wise soil series had been registered and correlated for 13 States. For the remaining States the work is in progress. However, the timeframe for completion of the task was not given by the ICAR.

26. Explaining the reasons for improper maintenance of National Register of Soil Series the Ministry have stated as under:—

"As the scientists remained busy in accomplishing the task of mega project on Soil Resource Mapping and NATP mission mode projects, the work of correlation of soil series at State and national levels and their indexing in the national register could not be taken up between 1994-98".

27. The Committee have been informed by the Ministry that the National register of soil series was required to be updated from 1994. The updation has been resumed from 1999.

II. **Indian Institute of Soil Science, Bhopal**

28. The Institute came into existence on 16th April, 1988 at Bhopal, Madhya Pradesh. The aims and objectives of this Institute are as follows:—

"I. To carry out basic and strategic research on soils especially physical, chemical and biological processes related to management of nutrients water and energy.

II. To develop advanced technology for sustainable systems of input management in soils that are most efficient and least environmental polluting.

III. To develop expertise and backstop other organizations engaged in research on agriculture, forestry, fishery and various environmental concerns.

IV. To exchange information with scientists engaged in similar pursuits through group discussions, symposia, conferences and publications.

V. To collaborate with State Agricultural Universities, National, International and other Research Organizations in the fulfilment of the above objectives".

29. IISS, Bhopal had completed 36 projects during the period 1999-2004 and out of this, Audit had test-checked 19 projects. In two projects the objectives were achieved only partially. The details of these projects are as under:—

"IISS undertook a project on 'Organic pools and dynamics in relation to land use tillage and agronomic practices for maintenance of soil fertility' in May 2000 as lead centre with six co-operating centres at an estimated cost of Rs. 1.08 crore to be completed by December, 2003. The project was extended up to March 2004 with additional outlay of Rs. 3.14 lakh. The project was aimed to quantify the changes in soil organic Carbon and Nitrogen pools to assess the mineralisation potential and C-sequestration in soils of semi-arid and sub humid regions and to fit experimental data in different models of C-sequestration. Rs. 36.42 lakh was spent on this project by IISS till its completion. Completion report of the project revealed that the project was implemented only in seven out of targeted eleven districts. Due to delay in procurement of Carbon Hydrogen Nitrogen Sulphur analyser and Furrier Transform Infrared Spectrophotometer, the chemical analysis of the project was hampered. Due to non-materialisation of training of two scientists in the USA in modelling of Soil Organic Matter (SOM) and recent technique in SOM dynamics and measurements, one of the objectives of fitting of experimental data in different models of C-sequestration could not be achieved".

30. According to Audit, the reply of ICAR (December, 2004) contradicted the facts stated in the project completion report that chemical analysis of the project was hampered due to non-procurement of equipment and that fitting of data in different models of C-sequestration could not be achieved due to non-materialisation of training of two scientists. Further, ICAR had stated that the results could not be obtained for

Bhubaneswar and Hyderabad due to discontinuance of long-term fertilizer experiments at those locations as well as inability to carry out solid sample analysis at Anantapur and Jorhat.

31. The Committee sought to know the reasons for the partial achievement of objectives in respect of two projects undertaken by IISS, Bhopal. In response, Ministry of Agriculture informed the Committee as under:—

> "The project was aimed to quantify the changes in Soil Organic Carbon (SOC) and nitrogen pools to assess the mineralization potential and C-sequestration in soils of semi-arid and sub humid regions and to fit experimental data in different models of C-sequestration. The project proposal was sanctioned for only seven centres at All India Coordinated Research Project (AICRP) on Long Term Fertilizer Experiments (LTFE), IISS, Bhopal as lead centre and 6 co-operative centres namely, Ranchi, Akola, Solapur, Bangalore, Raipur and Junagarh. As per the objective of the project the target districts were fully covered. Barrackpore has been included as voluntary centre and its results were presented in the final report. As per 12 and 13 Scientific Advisory Panel (SAP) recommendation, out of eleven districts, four target districts *i.e.* Bhubaneswar, Hyderabad, Anantapur, and Jorhat were dropped from this project and these centres were allotted to another project "Assessment and improvement of soil quality and resilience for rainfed rice production system" under National Agricultural Technology Project (NATP).
>
> Even though the procurement of CHNS analyzer was delayed, most of the analysis of carbon pools were completed with other methods. The CHNS analyzer was procured afterwards and installed. Analysis of all the soil samples for various organic pools has been completed on March 31, 2004. One of the objectives for fitting of the experimental data into models could not be achieved due to lack of training of scientist abroad, as such training facility is not available in India. However, efforts are being made to fit and validate the data generated on Soil Organic Matter (SOM) pools under at various centres into the Centuary Model based on the knowledge gained by a scientist at AICRP LTFE centre (Coimbatore) and the modeling will be completed by March 31, 2006.
>
> The major achievements of the project were the quantification of changes in soil organic C and N pools and evaluation of the effect of variables on soil organic matter dynamics in various soils of the country. Imbalanced fertilizer application, particularly N alone, could not bring the equilibrium for C balance even after 29 years of rice-based cropping system in an alluvial Inceptisol. Continuous application of organic manure with mineral fertilisers has enriched organic pools".

32. A project on "Integrated Nutrient Management in major pulse based cropping system and identification of the most productive and remunerative systems" was undertaken by IISS from May 2000 to March 2004 as lead centre. Against the total provision of Rs. 30.66 lakh an expenditure of Rs. 18.83 lakh was incurred. The project involved six important cropping systems at different locations. The final report of the project revealed that experiments on three cropping systems were not conducted and

experiments on another cropping system were not conducted in two out of four locations. Consequently, the objective of identifying the most productive and remunerative pulses based cropping system under different soil and nutrient managment could not be achieved.

According to Audit the ICAR in their reply (December 2004) have stated that since the project had to be executed under farmer's field condition in participatory mode after selecting the farmers and villages in the target districts, the cropping sequences were revised midway after considering the views of the farmers. The reply revealed that this project was undertaken without giving due consideration to the cropping sequences prevalent in the target districts resulting in revision of the technical years programme after two eyars of starting the project.

33. In a note furnished to the Committee, the Ministry of Agriculture explained their position to the Audit observation as under:—

"In order to identify the most productive and remunerative pulse based cropping systems in three agro-eco regions of the country, NATP project was originally proposed with 6 cropping sequences after thorough deliberations among the participants and based on the literature survey. The cropping sequences were: (i) soybean-chickpea, (ii) rice (paddy)-chickpea/lentil, (iii) black gram (Urdbean)-chickpea, (iv) sorghum-chickpea, (v) sorghum-lentil, and (vi) soybean-lentil. The project was undertaken in the rainfed areas with pulse based cropping systems. Two most prevalent pulse based cropping systems were chosen in each district. Bhopal centre has taken up soybean-chickpea and soybean-lentil systems as these were the most prevalent pulse-based cropping systems in Bhopal and Raisen districts. Similarly, sorghum-chickpea and black gram-chickpea were taken up by Kanpur centre and soybean-chickpea and rice-chickpea by Rewa centre for Rewa and Satna districts. Out of six cropping systems originally proposed five systems were taken up in one centre or other except sorghum-lentil systems. In the conclusion report in place of blackgram-chickpea and rice (paddy)-chickpea, the same was written as Urdbean (Blackgram)-chickpea and rice (paddy)-chickpea, respectively. It was apparently not followed clearly by the audit party, and hence it was reported that three cropping systems were not conducted. The project was executed under farmers' field conditions in a participatory mode. The cropping sequences, which were prevalent in a particular area were taken up. Kanpur centre could not take up sorghum-lentil sequence as this cropping sequences was not prevalent in the area. The project was under NATP and was scrutinized at every stage from its formulation till satisfactory completion of the project through mid-term evaluation and correction by the Scientific Advisory Panel (SAP), site committee, facilitator of NATP (pulses).

The major objectives of the project were achieved. The salient findings are: Among the different interventions, 75% NPK+2.5t Farmyard manure (FYM)/ha+soil conservation measure proved to be better at Bhopal and Raisen districts whereas, at other centres NPK+FYM proved better. Among the cropping systems, soybean-chickpea rotation proved better at Bhopal and Raipur centres in Madhya Pradesh".

34. When enquired about the reasons for the subsequent changes in the original project proposal and taking up only two cropping sequences were taken up instead of six cropping sequences the Ministry stated in a note furnished subsequently to the Committee as under:—

> "In order to identify the most productive and remunerative pulse based cropping systems in three agro-ecoregions of the country, the NATP sub-project (RPPS-11) was originally proposed with 6 cropping sequences after thorough deliberations among the participants and based on the literature survey. The cropping sequences identified were: (i) soybean-chickpea, (ii) rice (paddy)-chickpea/lentil, (iii) black gram (urdbean)-chickpea, (iv) sorghum-chickpea, (v) sorghum-lentil, and (vi) soybean-lentil. Out of six cropping systems originally proposed five systems were taken up except sorghum-lentil system which farmers did not opt. This fact/change was brought to the notice of Scientific Advisory Panel and they approved it. In the Final Report in place of blackgram its local name urdbean was printed and that created confusion with autitors. It was apparently not made clear to the audit, and they reported three cropping systems which were actually five.
>
> Moreover, a structured Monitoring and Evaluation (M&E) system was followed for review. The final project report was accepted without any objection and the AED (rainfed) in its letter congratulated the project workers and commended them for successful completion of the project".

35. When asked whether all the cropping sequences could not be taken up due to reluctance of farming community to participate in these projects, the Ministry replied as under:—

> "Only one (sorghum-lentil) sequence at Kanpur centre was not taken up as it was not preferred by the farmers".

36. When further asked about the apprehensions of the farming community and whether the same had been suitably addressed, the Ministry in reply have stated as under:

> "The one cropping sequence of sorghum-lentil did not fit into their changed socio-economic and market situation. This item was also dropped by Scientific Advisory Panel".

37. Enumerating the reasons for not achieving the desired results in Soil Science Research projects, a representative of ICAR during evidence deposed as under:—

> "In case of Indian Institute of Soil Science, Bhopal, the project was proposed and it was approved. Later on it came under the National Agricultural Technology Project. We committed that we will do it in 11 districts. Then a SAP Committee came and transferred four centres to other projects. They scaled down. There is a proper proceeding also for this purpose and for this amount. They said you can do only at seven centres. That is why, the work was scaled down from 11 centres to 7 centres. So, depending upon the resources, it was scaled down. It is not that the result was not realised. This was scaled down with matching saving

of resources. It was done by the duly authenticated Scientific Committee so that the outcome should be in line with the resources. This was not done by the Institute".

38. In reply to a query about the reasons for non-achievement of objectives in respect of Soil Organic Matter (SOM), the Ministry have stated that the concerned scientist could not undergo requisite foreign training as his foreign deputation had not materialised due to administrative reasons.

39. On being asked to specify the administrative reasons due to which the concerned scientist could not proceed on foreign deputation for undergoing training, the Ministry submitted as under:—

"A proposal of sending 6 scientists to Department of Natural Resource & Mines, Brisbane, Australia was received from the Agro Ecosystem Director (Rainfed), DRIDA, Hyderabad for a period of 2 weeks *i.e.* March 10 to 24, 2003. The case was sent for approval of the Competent Authority of the Council. However, the Competent Authority *i.e.* the then President of ICAR (Hon'ble Union Agriculture Minister) did not approve the proposal".

40. When asked as to why no suitable replacement was made to ensure that work was not hampered the Ministry replied as under:

"Necessary replacement was made by using the alternative statistical models' using SPSS package in place of originally proposed GCTE-SOMNET model in the project".

41. The Committee desired to know as to what measures were taken by the Ministry to ensure that such a situation did not occur in future. In reply, the Ministry have stated as under:—

"In future proper orders will be issued either for dropping some work or to adopt alternative course. Detailed instructions and guidelines to ensure timely completion and report writing have been issued by headquarters and by Institutes".

III. Central Soil Salinity Research Institute (CSSRI), Karnal

42. The Central Soil Salinity Research Institute was established in 1969, to generate technologies for reclamation and management of salt affected soils, which constituted nearly 7 million ha area at that time. Because of introduction of irrigation without provision for adequate drainage the salinity problem was appearing in almost all the canal command areas and sizeable area was going out of cultivation. Over the years, the Institute has grown into an internationally recognized center of excellence pursuing interdisciplinary research on salinity management and use of marginal quality irrigation waters in different agro-ecological regions of the country. The institute has three regional research stations, *viz.* Canning town (West Bengal) for manging coastal salinity, Bharuch (Gujarat) for the management of salt affected Vertisols and Lucknow (Uttar Pradesh) for managing alkali soils of Central and Eastern Gangetic plains. In addition, the coordinating Unit of All India Co-ordinated Research Project on Management of Salt-affected Soils and Use of Saline Water in Agriculture is also

located at the institute alongwith eight research centres in different agro-ecological regions.

43. The aims and objectives of the Institute are as under:—

"I. To develop comprehensive information on the extent, characteristics, genesis and classification of salt affected soils in different agro-climatic zones of the country, and to monitor changes in benchmark soils.

II. To study salt and water dynamics and hydrology of salt affected soils and to develop appropriate agro-chemical/biological/hydrological technologies for prevention/amelioration/management of salinity prone as well as salt affected soils.

III. To identify areas with poor quality surface and ground waters, to study the factors governing their chemical composition and evolve methods for reusing them for agriculture under different agro-ecologies.

IV. To collect, assess and develop plant genetic resources tolerant to stresses arising due to excess of salts, sodicity and water stagnation and to identify the traits responsible for tolerance to these stresses in selected plants of economic importance and develop efficient varieties in collaboration with relevant research programmes in the country.

V. To develop technologies suitable for reclamation/utilization of salt affected soils under various constraints and management levels in major salt affected areas.

VI. To serve as a centre for post-graduate education and training, both at national and international levels in the field of soil salinity and related aspects.

VII. To collaborate with agricultural universities, other central and state agencies and international organizations in research, training and extension programmes in reclamation/utilization of salt affected soils."

44. During the period 1999-2004, CSSRI, Karnal had completed 72 projects and out of this 40 were test-checked by Audit. According to Audit in two projects the objectives were partially achieved. The details of which are given as under:—

"(i) CSSRI undertook an externally aided Indo-United Kingdom collaborative research project on "Soil salinity and breeding of salt resistant crops (soil salinity and breeding for salt resistant crops — rice, Indian mustard and gram)" in March 1996 for five years at a total cost of Rs. 5.63 crore. Scrutiny revealed that six scientists of CSSRI visited United Kingdom in the first year of the project and undertook studies on alkaline soil instead of both alkaline and saline soils. The progress report of 1996-97 revealed that two of the six scientists who were abroad in connection with the project did not contribute anything. The final report was not yet prepared as of June 2004.

While accepting that the projects include both saline and alkaline soils ICAR had stated (December 2004) that all scientists contributed to achieve the project objectives and that the final report was being prepared. The reply has to be viewed in the light of the fact that the progress report clearly revealed non-contribution by the two scientists and the final report was yet to be prepared even after a lapse of three years from the completion of the project.

(ii) An All India coordinated research project on "Management of salt affected soils and use of saline water in agriculture" was implemented from 1972 at the coordinating unit at CSSRI, Karnal alongwith seven centres at State Agriculture Universities (SAUs) and one at Agricultural College, Agra. An amount of Rs. 7.19 crore was spent on the project during 1999-2004. The benchmark survey for quality control of ground water was undertaken from 1972 only in Guntur district of Andhra Pradesh, but no strategy had been formulated as yet to solve the water problems of that area. Thus, one of the objectives of evaluating the effect of poor quality water on soils and crops was limited to only one region. Apart from this, there was unspent balance of Rs. 1.02 crore accumulated with the centres over the years due to non-adjustment of previous years' unspent balance while releasing further grants to them".

45. When the Committee sought to know the reason for partial achievement of objectives in respect of two projects undertaken by CSSRI, Karnal, the Ministry have informed as under:—

"So far as the externally aided Indo-United Kingdom collaborative research project on "soil salinity and breeding of salt resistant crops (soil salinity and breeding for salt resistant crops — rice, Indian mustard and gram)" is concerned all the scientists contributed to achieve the project objectives and undertook studies on both alkaline and saline soils instead of only alkali soils. As per the ICAR norms, the deputation report is to be submitted by the scientists within a month of return. Specifically, in the case of two scientists namely, Dr. V.R. Babu and Dr. A.B. Mondal, the deputation reports were not submitted within the required period leading to the comments about their non-contribution in the 1996-97 report. However, they submitted their deputation reports in Nov. 1997 and Jan 1998 repsectively and these have been accepted by the Institute and the council. The final report of the project was submitted on 18th Nov. 2004. The internal experts from the institute and the Council have already seen the final report of the project. There is no provision of getting the report evaluated by the external experts. Moreover, the final report have also been submitted to the funding agency and there is no adverse comments whatsoever by the funding agency".

46. As regards All India Coordinated Research Project on "Management of Salt Affected Soils and use of Saline Water in Agriculture" the Ministry have stated as under:—

"Under above mentioned project, the water problems of the coastal belt of Guntur area have been solved through studies on Doruvu technology. This technology has been optimized to extract fresh water overlaying the saline underground water in the region. The technology has found favours with the farmers in the coastal belt. Further, as a follow up action on the studies conducted in AP, a cess fund scheme was sanctioned under which benchmark sites have been identified in the following irrigation commands in collaboration with AICRP centres. The soils of these sites are being monitored by the centres of the project as mentioned below.

Irrigation Command	**AICRP centres**
Upper Ganga canal command	Agra U.P.
Agra canal command	-do-
Sharda Sahayak canal command	-do-
Krishna Western Delta canal command	Baptala, A.P.
Nagarjuna Sagar right canal command	-do-
Godavari Westerb Delta canal command	-do-
Tungbhadra canal command	Gangawati, Karnataka
Indira Gandhi canal command	Bikaner, Rajasthan
Narmada Sagar canal command	Indore, M.P.
Upper Krishna canal command	Tiruchirapalli, T.N.
Cauvery canal command	-do-
Bhakra canal command	Hisar, Haryana
Jawahar Lal Nehru canal command	-do-

The soils of these sites have been characterized. The extent of salt affected soils havebeen computed. The temporal changes in different benchmark sites are being studied. After studying these aspects, possible land use planning will be done.

Out of the total unspent figure of Rs. 1.02 crores, 78% (Rs. 78.19 lakhs upto December, 2005) of the amount has been adjusted. Further, steps have been initiated to minimize the unspent balance at each centre. The balance amount will be adjusted in the current financial year when further grants will be released. Instructions have also been given to the centres to effect the purchase of items in the current financial year. As a result of these steps, it is expected that there would be no unspent balance at the end of current financial year".

Non-Preparation of Maps of Salt Affected Areas

47. In its meeting held in February 2000, the Research Advisory Committee (RAC) had recommended preparation of maps for total salt affected areas of the

country to know the latest position of the country's salt affected areas. It recommended that CSSRI should undertake this task of identification to have a final and authentic record. ICAR was to coordinate with different agencies to prepare this map upon a single figure. However, no timeframe had been fixed to complete the task. The action taken report revealed that the map of salt affected soils on 1:2,50,000 scale for Bihar, Haryana, Orissa, Karnataka, Madhya Pradesh, Punjab, Uttar Pradesh and West Bengal had been prepared. But for the remaining states, no work was started as yet.

48. In their reply (December 2004) to the Audit, ICAR had stated that the preparation of the maps was delayed since most of the maps were designated as restricted by Survey of India and it requied considerable time to get clearance from the Ministry of Defence prior to their procurement from Survey of India.

49. When asked to furnish the status of preparation of maps of salt affected soils, the Ministry have stated as under:—

> "The Salt affected soils occur in only 15 states of India. The maps of eight states namely; Bihar, Haryana, Orissa, Karnataka, Madhya Pradesh, Punjab, Uttar Pradesh and West Bengal were prepared earlier. The maps for the remaining seven states namely; Andhra Pradesh, Andaman & Nicobar, Gujarat, Kerala, Maharashtra, Rajasthan and Tamil Nadu have been prepared now. The total area of salt affected soils in 15 states is computed to be 67,27,468 ha".

50. When asked as to how ICAR ensured that the recommendations made by the RAC regarding preparation of maps of salt affected soils of India were carried out by the CSSRI, the Ministry in their reply have stated as under:

> "The CSSRI carried out recommendations of the RAC in preparation of salt affected maps of India in coordination with NRSA and other agencies. The role played by CSSRI includes formulation of mapping legend, deciding on criterion on the ranges of soil PH, EC and ESP for different SAS classes, provided ground truth data on SAS classes of different states and analysis of key soil samples for salinity appraisal. During the process of mapping, the CSSRI also played a vital role in reconciling and deciding a number of issues on SAS class polygons, calculation of polygon extent, and purity percentages of each SAS class".

Non-documentation of Traditional Wisdom

51. The RAC had recommended in February 2000 to refine and update the traditional agricultural practices being followed in different parts of the country. Various traditional practices like soil- reclamation, land use, water management, nutrient management etc. were to be collected and documented. However, CSSRI had not taken any action on this issue as of June 2004. In December 2004, ICAR had stated that due to constraints of non-availability of scientific personnel, documenting the traditional wisdom was not taken up in detail and the study would be conducted in future. It added that some information on traditional wisdom was collected from the Gujarat region.

52. In this regard the Ministry have stated as under:—

> "In fact, council have launched a mission mode project for the documentation

of indigenous traditional knowledge (ITKs) and till December, 2005, five volumes of ITKs with two supplementaries running into around fifteen hundred pages have already been published. This includes traditional knowledge on all aspects of agricultures. In addition, additional systematic compilation eforts on the traditional agricultural practices have been initaited. A research project on documenting the traditional agricultural practiices is being undertaken in the institute. Fiekld surveys have also been conducted for their documentation. Based on the total information, the document is being prepared. it is in the final stage of its editing and publication".

53. During evidence, the representatives of the Ministry explained as under:—

"As far as preparation of map is concerned, it is already complete. As far as documentation of indigenous technical knowledge which was referred to is concerned, we ahve brought about in general for the country five volumes on indigenous technical knowledge including salt affected soils".

54. To a specific question, as to why the Ministry did not find it necessary to initiate the project much earlier when RAC had recommended for documentation of traditional wisdom way back in February, 2000, the Ministry clarified in a note as under:—

"In fact, Council have launched a mission mode project for the documentation of indigenous traditional knowledge (ITKs) much earlier and till December, 2005 five volumes of ITKs with two supplementaries running into around fifteen hundred pages have already been published. This includes traditional knowledge on all aspects of agriculture including soil reclamation, land use, water management and nutrient management etc.In the mean time, the Research Advisory Committee of the CSSRI, Karnal have also recommended for documentation of traditinoal wisdom for salt affected areas. These were taken up in July, 2004. Accordingly, systematic compilation efforts on the traditional agricultural practices being followed in salt affected soils were initiated".

IV. Water Technology Centre for Eastern Region, Bhubaneshwar

55. As the Eastern Region of India was confronted with erratic and uneven distribution of rainfall, frequent floods in its plains, soil erosion and drought in hills and plateau and cyclones and salinity in coastal areas, a need was felt, to devise and implement location-specific technologies for effective utilization and management of soil & water resources of the region. Accordingly, the Indian Council of Agricultural Research (ICAR) set up Water Technology Centre for Eastern Region (WTCER) at Bhubaneswar on 12th May 1988 to generate the requisite technologies for the region.

56. The aims and objectives of this Institute are as follows:—

I. To undertake basic and applied research for developing strategies for efficient management of on-farm water resources to enhance agricultural productivity on sustainable basis in the eastern region.

II. To provide leadership role and coordinate network of research with the State Agricultural Universities in generating location-specific technologies for efficient use of water resources in the eastern region.

III. To act as a centre for training in research methodolgies and technology update in the areas of agricultural water management in the region.

IV. To act as repository of information on agricultural water management in the eastern region.

V. To collaborate with relevant national and international agencies in achieving the above objectives."

57. Out of the 28 projects that were completed by WTCER during 1999-2004, 20 projects were test-checked by Audit. In three projects, partial achievement of the objectives were noticed. The details of these Projects are discussed in the succeeding paragraphs:—

(a) In order to formulate an integrated water and nutrient management strategy for sustainable productivity of the eastern region by studying influence of water regimes on soil chemical environment and availability of nutrients, WTCER undertook a project on "Nutrient dynamics in soils under different water management practices" in November 1998 and completed in November 2001 after an expenditure of Rs. 21.61 lakh. The final report of the project revealed that soil samples were collected only from two districts of Orissa instead of major soil groups from different benchmark sites as envisaged in the project. WTCER did not undertake micronutrient studies (Zinc and Iron) as planned since the Atomic Absorption Spectrophotometer Costing Rs. 15.10 lakh was installed at the fag end of the project in August 2001 and was made operational only in March 2002 after completion of the project. Thus, achievement was limited to that extent.

In their reply furnished to Audit in December 2004, ICAR had stated that micro-nutrient studeies could not be undertaken due to delay in receipt and installation of Atomic Absorption Spectrophotometers.

(b) WTCER undertook a project on "Mitigation of water logging from deltaic low land rice eco-system for enhancing agricultural productivity" in 1998. The duration of the project was five years at an estimated cost of Rs. 19.29 lakh. The objectives of the project were *inter alia* to design and develop suitable technology for rice-fish integration and to study the socio economic feasibility of the prescribed tecnologies. The long-term objectives were to provide a sustainable technology package for the deltaic low land rice ecosystem for increase in agricultural productivity. This integrated package in combination with aquaculture was expected to be a viable alternative for utilisation of rainfed low land of 20.5 million ha which was prone to water logging. The final report of the project revealed that after studying only one aspect of rice-fish integratison and an expenditure of Rs. 6.78 lakh, the project was prematurely closed in 2000. Thus, an integrated package as planned was not developed. WTCER stated in July 2004 that the principal investigator

and one co-investigator were granted study leave and another investigator was transferred. It was decided to carry out the project with modified objectives as per the SRC's decision. Thus, an integrated package as a viable alternative for combating water logging in deltaic lowland rice ecosystem was not developed.

(c) Another project on "Studies on agro-meteorological parameters for evolving sustainable crop production strategies in selected location of eastern region": was undertaken by WTCER from January 1998 to January 2002. The objectives of the project were to compile agro-meteorological parameters to study the agro-climatic feasibility of crop production in West Bengal, Orissa, Bihar, eastern part of Uttar Pradesh, northern Madhya Pradesh, north Andhra Pradesh, Assam and the adjacent states, to analyse initial conditional probability of rainfall for evolving sustainable crop production strategy in those locations and to characterize drought periods and critical dry spell in respect of agricultural crop production on the basis of water balance and rainfall probability. The final report of the project revealed that WTCER collected and compiled the data of selected zones of Orissa and West Bengal only. Since these two locations were not sufficient for evolving any strategy for crop production, the project was merged with another project titled "Appraisal of resources base and identification of land, water, climate and socio-economic constraints in managing water resources for agricultural development in eastern India" in July 2000. In spite of the merger, the earlier project started in January 1998 was continued without any activity and declared completed in January 2002 after an expenditure of Rs. eight lakh. However, even after merging the project no work was undertaken for evolving crop production strategies for different agro-climatic zones of eastern India as envisaged.

In their reply furnished to Audit (December 2004) ICAR had stated that owing to the constraints in technical manpower, the project was planned to cover selected locations of eastern India that represented different agro-climatic zones of Orissa and West Bengal. According to Audit, the reply highlights weakness in management of human resources. As a result the crop production strategies for whole of eastern India could not be evolved.

58. In a note furnished to the Committee, the Ministry have stated their position in respect of the above projects, as under:—

"Twelve major soil groups covering entire state of Orissa were studied in the Project. Micronutrient study was initiated to assess soil and crop management impact on water quality by analysing water samples from various locations only after the procurement of Atomic Absorption Spectrophotometer at the fag end of the Project. Such delays would be avoided in future by proper assessment of equipment needs based on planned activities.

The Project was envisaged to develop an integrated technology in combination with aquaculture as a viable alternative for combating water logging in low land rice eco-system. The work could not be completed as the Principal

Investigator and one co-Principal Investigator proceeded on study leave while another co-principal investiagor got transferred. It was decided to carry out the Project with modified objectives to develop sustainable technology package for low land rice eco system with surface drainage as per the Staff Research Council decision. The work was carried out under the Project “Management of excess water in medium and low lands for sustainable productivity" during 2000-2005. The Project developed a sustainable technology package for low land rice eco-system with surface drainage. Realizing the success of the Project, the State Government of Orissa has adopted this Technology.

The efforts were made to study agro-meteorological parameters in the States of Bihar, Chhattisgarh, North Andhra Pradesh and Assam and Northern Eastern States. The studies were confined only to selected zones of Orissa and West Bengal. As these two locations were not sufficient for meeting the objectives of the Project, the same was merged with another Project entitled "Appraisal of resources base and identification of land, water, climate and socio-economic constraints in managing water resources for agricultural development in Eastern India". The agro-meteorological parameters were studied and data pertaining to Assam, Bihar, Chhattisgarh and North Eastern States have been compiled and crop production strategies formulated."

V. Central Soil and Water Conservation Research & Training Institute, Dehradun

59. A chain of Soil Conservation Research, Demonstration and Training Centres were established in 1954 (during the First Five Year Plan) and during the subsequent Five Year Plans in different problem areas located at Dehradun, Kota, Vasad, Agra, Chandigarh, Bellary, Udhagamandalam, Jodhpur and Chatra (Nepal) under the Central Soil Conservation Board in the Ministry of Agriculture and Cooperation. The Centres at Dehradun, Kota, Vasad, Agra, Chandigarh, Bellary and Udhagamandalam were reorganized into the present set up of Cetnral Soil and Water Conservation Research and Training Institute (CSWCRTI) on 1st April 1974 with its headquarters at Dehradun. Two new Centres at Datia (M.P.) and Koraput (Orissa) were added to this set up in 1986 and 1992, respectively. These nine Centre sare located in seven agroecological regions to cater the location specific problems of the country.

60. The aims and objectives of the institute are as under:—

“I. Undertake research and develop strategies for controlling land degradation under all primary production systems and rehabilitation of degraded lands in different agro-ecological zones of the country.

II. Act as a repository of information on the status of soil degradation/soil and water conservation.

III. Provide leadership and co-ordinate research network with State Agricultural Universities/Institutions/NGOs/State Departments for developing location-specific technologies in the area of soil and water conservaton.

IV. Act as the national and international Centre for training in research methodologies and updated technology in soil and water conservation, watershed development and its management.

V. Provide consultancy and collaborate with national and international institutions in the field of soil and water conservation."

61. Audit review revealed that CSWCR & TI, Dehradun had completed 86 projects during 1999-2000 to 2003-2004. But the project records were maintained in respect of 16 projects only. Test-check of records of these projects by Audit had revealed several shortcomings which are discussed in the succeeding Paragraphs.

62. As per Audit, CSWCR&TI, had not maintained research project files in respect of 70 projects. When asked as to how in the absence of such files, the results and data were presented before SRC and RAC, the Ministry responded as under:—

"Although, the research results pertaining to certain projects were not entered into respective RPFs, the same were maintained by the concerned scientist in the field observation sheets/data registers for presentation and evaluation before SRC and RAC".

63. To a specific query as to how the projects were treated as completed in the absence of proper project files, the Ministry have started:—

"Although the project files were not properly maintained, the mandated research work was carried out by the concerned scientists. The data available in field books, lab registers, annual reports, paper presented in the workshops and the final outcome brought out in the form of reports were sufficient co-lateral evidences. Hence, the projects were treated as completed accordingly. The concerned project files are now propertly updated".

64. The Committee desired to know the internal management system prevalent in ICAR. In reply, the Ministry stated as under:—

"The ICAR carries out basic, strategic, applied and anticipatory research in agriculture at different institutes in participation with State Agricultural Universities and certain other research bodies. The institutes have in its fold large number of All India Coordinated Research Projects, Network Projects and Adhoc Projects catering to the research needs at national, regional and local levels. The research priorities are discussed and determined in Research Advisory Committee, Staff Research Council, Directors' Conference and Institute Management Committee meetings of the institutes. The institutes get regular feed back on research needs and priorities from Regional Committee Meetings, Annual General Body Meetings with members drawn from ICAR HQ, State Functionaries and Farmer Groups. The day to day research problems and needs are also discussed and proritized in DAC-ICAR interfaces held twice a year. The projects are regularly monitored and evaluated by Quinquennial Review Teams, Staff Research Councils, Research Advisory Committees and Project Workshops of the Institutes. The Research Management Officials at ICAR HQ (DG, DDGs' and ADGs') coordinate the whole affair for smooth and effective functioning of the Research Management System. The Governing Body of ICAR oversees, guides and sets forth the overall research agenda of the council".

Non-achievement of Objectives.

65. The objectives of the institute were not achieved in respect of the following projects undertaken by it. The details of the projects are as under:—

"(a) CSWCR&TI undertook a project on "Appraisal/Investigation of surface and sub-surface water harvesting systems in the Nilgiris and adjoining lower hills" from 1996 to 2000 at a total expenditure of Rs. 4.10 lakh. The objectives of the project were *inter alia* to study the hydrologic response in terms of hydrologic process controls and channel flow across different spatial scales (size of watersheds) and land uses in Nilgiris, to suggest rainfall catchment area and pond capacity relationship and hydrologic budgeting of ponds. The final report of the project revealed that hydrologic budgeting of ponds was not discussed, evidencing that no activity was undertaken in this area. However, ICAR had stated that the study was discontinued as the ponds had higher outflow than inflow which could not be correctly accounted for as these types of ponds were not only fed by surface runoff but also by spring (sub-surface). Therefore the hydrologic budgeting could not be carried out. According to Audit the reply of ICAR has to be viewed in light of the fact that investigation was to be conducted both for surface and sub-surface water systems.

(b) A project on "Methodologies for development and analysis of watersheds and decision support systems for interventions" was undertaken by CSWCR & TI from October 1999 to December 2003 at a total cost of Rs. 5.13 lakh. The project aimed to collect data on nine watersheds in the Shiwaliks and to develop methodology for optimising land use patterns in the watersheds leading to sustainable development. The final report of the project revealed that methodology for development and analysis of watershed could not be developed due to lack of interdisciplinary team. Thus, the aim of the project was not achieved.

(c) Another project on "Development and evaluation of soil and water conservation measures and land use systems for sustainable crop production in Western Ghats of coastal region" was undertaken by the Institute from June 2000 to September 2003 at an outlay of Rs. 52.15 lakh. The project was taken up for evolving and testing different bio-engineering measures of soil and water conservation, water harvesting system, water management alternatives and suitable land use systems prevalent in the region. The project was implemented at State Horticulture farm in Tamil Nadu, which represents the low elevation and high rainfall zone of the Western Ghats. The final report of the project revealed that conclusions could not be drawn because the experiment was conducted with newly planted perennial crops like cardamom, pepper, mandarin orange, bush pepper and tea which would take at least four to five years for yielding. The project was, therefore, continued from October 2003 to March 2004 as in-house project. Thus, the benefit of evolving and testing different bioengineering measures of soil and water conservation could not be derived even after an expenditure of Rs. 28.67 lakh. However, ICAR stated (in December 2004) that due to closure of the project in

September 2003 by Agro-Eco Directorate (Coastal) of National Agricultural Technology Project, the project could run only for three years. Further, due to termination of senior research fellow and the experiment site being located at a faraway place from the research centre, the experiments could not be carried out and had to be conducted in its own farm. It added that had the project been continued upto August 2004, data for three years could have been collected and conclusions drawn on the initial establishment and growth of crops."

66. Explaining the position about these three projects the Ministry have stated as under:—

"(a) Central Soil and Water Conservation and Research and Training Institute (CSWCR&TI), Dehradun undertook a project on 'Appraisal/Investigation of surface and sub-surface water harvesting systems in the Nilgiris and adjoining lower Hills' at a cost of Rs. 4.10 lakhs to suggest efficacy of water harvesting systems in the Nilgiris and rainfall catchments and pond capacity relationship/hydrologic budgeting of ponds. The study of sub-surface hydrology is a long term study to arrive at definite conclusions. As an NATP (Coastal) project the work was conducted for 3 year's duration and continued as institute project for another three years because sub-surface hydrology requires installations of piezometers or observation wells and variations in rainfall has also to be taken into account. Hence, the outcome of the study will be helpful in evaluating the water harvesting systems in Nilgiris.

(b) The NATP project on Methodologies for Development and Analysis of watershed and decision support systems for interventions at a cost of Rs. 5.13 lakhs was undertaken in Shiwaliks to develop methodologies for optimizing land use pattern in the watershed both at Dehradun and Chandigarh. The research data emanated from the project could not be analyzed due to non-availability of the requisite software at that point of time. Now the software called FACILITATOR has been procured from USA and the concerned scientist trained on the software. This study would be completed by March, 2007.

(c) CSWCR&TI, Dehradun undertook a project on "Development and evaluation of soil and water conservation measures and land use systems for sustainable crop production in Western Ghats of coastal region" from June 2000 to September 2003. Rs. 28.67 Lakhs were incurred on development and evalulation of Soil and Water Conservation Measures and Land Use Systems for sustainable crops production. The study found tangible benefits of soil conservation measures (vegetative barriers) from Rs. 36000 to Rs. 54000 per hectare and intangible benefits from Rs. 11000 to 20000 per hectare. The newly planted perennial crops were put to act as vegetative barriers which started serving their role in checking erosion and conserving water after 4 to 5 years. The observations are being continued on the perennial vegetation planted in respect of protection of soil and

water resources and enhancement of overall productivity from September, 2003 onwards as an Institute project."

Non-transfer of technology

67. According to Audit sixteen technologies involving a total cost of Rs. 243.86 lakhs which were developed by the institutes of ICAR had not been transferred to the end-users. The details of these are given in Annexure-I.

68. The Ministry in a detailed note have explained their position regarding non-transfer of technologies as under:—

CSSRI, KARNAL

(a) The project on Soil site suitability maps for Bara tract area for different crops was undertaken at the cost of Rs. 14.08 lakhs at RRS, Bharuch. The project was aimed mainly at identifying bottlenecks in the present land use pattern in the region and to suggest the plausible management options. Since the region has been brought under irrigation from the Sardar Sarovar irrigation project about one year back, in-depth studies on changes in cropping pattern, soil characteristics and improvement in soil for taking remunerative crops needs to be studied further before transferring the developed package to the farmers. A project is being formulated to study these aspects for a period of 3 years which would be corroborated with pre-irrigation scenario.

(b) The second project on Biodrainage to control the water logging in development of secondary Stalinization of canal irrigated soils was funded by Ministry of Water Resources at a cost of Rs. 28.94 lakhs. The objectives of the project were completed and the final report has been accepted by the funding angency. Based on the findings of the studies, the development departments of Haryana and Rajasthan States have initiated further developmental/transfer of technology activities as mentioned below:

* In Haryana, a project of Rs. 385 crores has been formulated by CADA for implementation.

* Another proposal of Rs. 8.30 crores have been sent by Forest department, Haryana to CADA, Govt of India for implementing biodrainage in the districts of Sirsa, Fatehabad and Hisar in Bhakra canal command and Bhiwani, Rohtak, Jhajjar and Sonepat in Western Jamuna canal command.

* Based upon these findings, a project is already in action in Indira Gandhi Nahar Pariyojana command in Rajasthan.

* Further, training lectures were given to forest officials, irrigation engineers and other officials of Haryana and Rajasthan.

* The results of this project have also been disseminated through 13 research publications in different research journals.

* A training program has also been proposed to train 20 scientists/ officials on this concept.

(c) The third project on investigation and design of sub-surface drainage in water logged alkali soils was undertaken at a cost of Rs. 4.10 lakhs to study whether the concept of horizontal sub-surface drainage would work in waterlogged alkali soils. The immediate objectives of the project were fulfilled, and indicated that sub-surface drainage can work in alkali soils also. This concept is being tested under actual waterlogged alkali soils in Uttar Pradesh by a team of scientists from Regional Research Station, Lucknow for further refinement, assessment and transfer to specific areas of different states.

WTCER, BHUBANESHWAR

(a) The institute developed the Fish-crop rotational cropping technology meant for optimizing 40 lakh ha of waterlogged shallow low land for conservation of water, at a cost of Rs. 6.00 lakhs. The technology developed was successfully demonstrated on farmers' fields in Khurda District of Orissa. For further, dissemination of this technology in other eastern states, 150 agriculture/irrigation department officials were trained. Besides, two leaflets were prepared on the subject and have been sent to State Agricultural Departments.

(b) For conservation of water and yield enhancement, Drip Irrigation Technology was developed at a cost of Rs. 6.03 lakh. The technology was successfully demonstrated to show water economy as well as yield enhancement for vegetable and horticulture crops. At present 2000 ha. area is under drip irrigation in Orissa. This technology is being promoted through various state Agricultural/Horticultural Departments. Further, Institute also imparted the training to 150 agriculture/ horticultural department officials to promote this technology in their respective states.

(c) To provide irrigation to undulating Plateau area of Eastern India for enhancing productivity, production and income as also to control run off, the technology of low cost proof channels, tanks and run off cycling based irrigation system was developed with a cost of Rs. 5.43 lakhs. This technology was successfully transferred to farmers' fields in villages of Keonjhar of Orissa state. Large number of farmers of plateau region of eastern India are adopting this technology. The institute has further imparted training programmes and organized a national level workshop on the subject in which around 230 state officials from agriculture and irrigation department participated. On the subject one bulletins and two leaflets were prepared and sent to various states to disseminate this technology to farmers.

(d) A technology for suggesting suitable sowing date for green gram in paddy fallows based on receding soil moisture was developed at a cost of Rs. 6.75 lakhs. This technology was successfully demonstrated in Khurda and Puri districts of Orissa on farmers' fields. The developed technology is being further demonstrated through All India Coordinated Research Project on Water Management at Jorhat, Shillong, Kalyani, Bilaspur and Chiplima. Further, the institute organized training programmes on the subject and 150 agricultural/irrigation department officials were trained to further disseminate this technology in their respective states.

(e) To conserve excess rain water, optimum dike height under rice culture was standardized with a cost of Rs. 21.92 lakhs. The developed technology was successfully demonstrated in the villages of Dhenkanal district of Orissa. Further, the institute organized training programmes on the subject and 150 agricultural/ irrigation department officials were trained to further disseminate this technology in their respective states. One bulleting on the subject was prepared to transfer this technology and was sent to respective states for disseminating this technology.

(f) The technology of moisture conservation and weed suppression package for pointed gourd was developed at a cost of Rs. 20 lakhs and demonstrated in three locations under different soil conditions. The technology has been taken up by the farmers of coastal districts of Orissa and West Bengal. Further, the institute organized training programmes on the subject and 150 agricultural/irrigation department officials were trained to further disseminate this technology in their respective states. One bulleting on the subject was prepared to transfer this technology and was sent to respective states for dissemination.

CSWCR & TI, DEHRADUN

CSWCR & TI, Dehradun, took up 4 projects costing Rs. 12.11 lakh. The technologies developed under these projects, were transferred through various training programmes meant for officers/extension workers of different development departments of agriculture, forestry, soil conservation, animal husbandry and irrigation and drainage etc. The technologies developed were also disseminated through Lab to Land Programme, Institute Village Linkage Programme, Farmers' trainings and Visits and Extension Publication, etc.

IISS, BHOPAL

(a) The institute has perfected the technologies for vermicomposting and enriched organic manures at a cost of Rs. 16.92 lakhs. Two video films relating to vermicomposting and enriched compost production technologies have been prepared for distribution to state extension agencies. Technical bulletin on vermicomposting has been published in Hindi language and distributed to farmers of Rajharh and Vidisha districts during "Farmers' Meet Programmes". About 5—10% of the farmers in these districts are practicing vermicomposting and enriched composting technologies.

(b) Integrated Plant Nutrient Supply (IPNS) technology developed by the institute at a cost of Rs. 31.50 lakhs for Soyabean-Wheat system has been communicated to the Director of Agriculture, Madhya Pradesh. The IPNS technology has been demonstrated to farmers in different villages of Bhopal, Vidisha, and Rajgarh districts of Madhya Pradesh. Non-Government Organizations (NGOs) have also been involved in popularization of technology at village level. In Mughaliahot village (Bhopal district), IPNS technology produced 8—49% more soybean and 11—39% more wheat yields as compared to farmers' practices. Similarly, farmers obtained 15—22% higher soybean yield over their conventional practice in Geelakhedi village

(Rajgarh district). Farmers' Meet Programmes have also been organized in adopted village to show the performance of IPNS technology to the farmers of other adjoining villages. IPNS technology has become popular among the farmers of this region *i.e*. Bhopal, Vidisha and Rajgarh districts.

(c) Integrated Nutrient Management (INM) technology developed for oilseeds and pulses at a cost of Rs. 69.88 lakhs, was demonstrated to farmers by conducting more than 255 demonstrations/field trials on over 100 farmers' fields in the participatory mode in 14 districts namely, Bhopal, Raisen, Satna, Rewa (MP), Hamirpur (UP), Bharatpur (Rajasthan), Raichur (Karnataka), Parbhani and Latur (Maharashtra), Mahaboobnagar, Palem (AP), Ranchi (Jharkhand), Nawansala and Ballowal (Punjab). Farmers were able to harvest about 14—23% more chickpea and 18—27% more lentil yidld through this technology. The INM practices are gaining acceptance among the farmers in these districts.

69. When asked about the measures taken by ICAR for transfer of technologies to the farmers that were developed by the Institutes, the Ministry have explained as under:

> "The transfer of technology is undertaken through various training programmes, "Lab to Land Programme", Institute Village Link Programme, farmers' fairs and visits and publications etc. The Krishi Vigyan Kendras impart regular training courses for dissemination of technologies. The poor linkages and coordination between the Institutes and users have resulted into poor transfer of technologies."

70. In this regard during evidence, the Secretary deposed as under:

> "As far as taking the technology to the farmer is concerned, you would kindly agree, agriculture being a State subject, there is a collapse in the very basic extension mechanism in this country and we are the sufferers on that count."

71. The Committee desired to know the measures taken for improving the coordination between the research institutes and State Government Agencies/line Departments. In response the Ministry in a note have replied as under:

> "Extension is a state subject. However, ICAR develops technologies, demonstrates, passes on to the line departments and trains the farmers. A number of the following mechanisms to facilitate cor-ordination between research institutes and State Government Agencies/Line Departments, have been improved."

(i) ICAR Regional Committees

The ICAR has set up eight Regional Committees for research-education and extension coordination in each of the eight agro-climatic regions of the country. One DDG has been made nodal officer for each Regional Committee to ensure better coordination.

The Regional Committees meet bi-annually to discuss and review the current status of agricultural research, education and extension education in the region, (ii) take decision on various problems faced by the region either in the execution of the approved programmes or in tackling the

problems emerging afresh, and (iii) to identify in the transfer, refinement and assessment of technology by extension agencies. The Regional Committee provides a forum for meaningful dialogue amongst research and development agencies in the field of agriculture, animal husbandry, fisheries, horticulture, agroforestry etc. and help in forging an effective liaison and coordination amongst ICAR Institutes, State Agricultural Universities and the State Development Departments of Agriculture, Animal Husbandry, Fisheries, Horticulture, Foresty, Irrigation, Rural Development etc. The Regional Committees are very important for monitoring and prioritizing the research and development needs of the region, sensitizing the planners and policy makers and to act as an interface between the various research organizations and the development departments. The recommendations arising out of the deliberations are communicated to the concerned State Agricultural Universities, State Development Departments and ICAR Institutes for taking necessary follow-up action.

(ii) Pre-Rabi/Kharif interface between Department of Agriculture and Cooperation and ICAR

The interfaces between Department of Agriculture and Cooperation (DAC), Department of Animal Husbandry, Dairy and Fisheries (DAHD&F) and the Indian Council of Agricultural Research (ICAR) are organized on pre-season basis to evolve joint strategy in research and development sectors. The recommendations are shared with the States during the National Conference on Agriculture for Rabi/Kharif Campaign. A special emphasis is laid on implementing the issues relating to strengthening of research-extension-farmers linkages at various levels.

(iii) National Conference on Agriculture for *Kharif* and *Rabi* Campaign

The Department of Agriculture and Cooperation of the Ministry of Agriculture organizes each year National Conference on Agriculture for *Kharif* and *Rabi* to interact with senior officers of the States/Union Territories and the Central Government to discuss important issues relating to Indian agriculture. The Vice Chancellors of Agricultural Universities and senior officers of ICAR participate in the campaign to provide necessary backstopping on technical issues.

(iv) *Kisan* Call Centres (KCC) — Coordination for responding

The DAC, Ministry of Agriculture launched *Kisan* Call Centres (KCC) on January 21, 2004 across the country to deliver agricultural extension services to the farming community. The purpose of these Call Centres is to respond to issues raised by farmers instantly in the local language on continuous basis. The KCC operates at three levels *viz.*, Level-I, Level-II and Level-III. The farmer's call landlines at the designated Call Centre for the State through a Toll Free Number 1551 and the call is picked up first by Level-I functionaries, who are agricultural graduates, and bases on the available data base, the answer to the problem is provided.

However, if the call cannot be answered by Level-I, it is escalated to Level-II, where a number of Subject-Matter Specialists (Agricultural University Scientists/ICAR Scientists) identified in advance, pick up the call and answer in the local language. The calls escalated from Level-II are resolved by consulting State Department of Agriculture, ICAR Institute and State Agricultural Universities and the replies are sent promptly by Level-III (Government of India Institutes of the Department of Agriculture and Cooperation).

(v) Research-Extension linkage at the district level

The Department of Agriculture and Cooperation (DAC), Ministry of Agriculture has set up Agriculture Technology Management Agency (ATMA). ATMA serves as a focal point for integrating research and extension activities at the district level. ATMA Governing Board has been constituted under the chairmanship of District Collector. Representatives from Zonal Agricultural Research Station, key-line departments, KVK, financial institution, market and input agency are the constituent members. One of the key activities of ATMA is to prepare a Strategic Research and Extension Plan (SREP) and its implementation by the various stakeholders.

(vi) Crop Weather Watch Group

This group meet every Monday and is chaired generally by an Addl. Secretary of DAC and even Secretary when calamity is severe. ICAR is always represented in this group to provide technical input for managing drought, floods and other natural calamities.

72. When asked whether the Ministry/ICAR had encountered any hurdles in the implementation of the programmes relating to transfer of technology, the Ministry replied as under:

"Most of the extension staff in the states have been assigned other tasks. Posts falling vacant are not being filled. Retraining of staff and retooling of extension services is a dynamic process. It requires periodic capacity building. Input agencies like seed, fertiliser, agro-chemical and credit etc. should also be brought on board to expand the basket of extension services. IT based communications like Kiosks, e-mail, voice mail, television and other multi-media products should be promoted to improve impact and effectiveness of the extension. KVKs are being interfaced with Director of Extension of State Agricultural Universities."

73. When enquired about the efforts made by the Department for providing better linkages between various agencies so that the research benefits percolate down to the actual users, the Ministry in their reply have stated as under:—

"The main agricultural extension system is operated by the State Governments. The Department of Agriculture and Cooperation (DAC). Ministry of Agriculture has set up autonomous Agriculture Technology Management Agency (ATMA). ATMA serves as a focal point for integrating research and extension activities at the district level. One of the key activities of ATMA is to prepare a Strategic

Research and Extension Plan (SREP) and its implementation by the various stakeholders.

The ICAR has established a network of Krishi Vigyan Kendras (KVK) to aim at technology assessment, refinement and demonstration of technology/products. The KVK network is further interfaced with State Agricultural Universities through their Directors of Extension."

Bio-Drainage Technology

74. The Ministry while furnishing the status regarding transfer of Technology had stated that all the technologies have been transferred except bio-drainage technology which needed some refinements before its wider dissemination. When asked to explain about the various aspects of Bio-drainage technology and their users, the Ministry have stated as under:

"The development of waterlogging and secondary salinization in the canal commands has led to tremendous loss of crop yields, damage to the houses and roads, loss in rural employment and serious animal and human health problems. Biodrainage is defined as the process of removing the excess soil water through transpiration using bio-energy of the plant and radiation energy of the sun. It is eco-friendly system of de-watering the land.

I. Does not have the problem of disposal of the drainage effluents.

II. Does not require skilled labour and can be adopted by the farmers themselves.

III. It is a low cost technology and thus does not require huge financial input.

IV. Eco-friendly as it promotes the area under forests. Improves the environment as the forest plant act as moderators of climate, windbreaks and sink for carbon-di-oxide.

V. It generates revenue for the farmer from the sale of wood.

VI. Can be adopted along with the conventional subsurface drainage to reduce the drainage effluents."

75. The Ministry have added that the following refinements were required in Bio-drainage Technology before its wider dissemination:—

"The technology requires further refinement in terms of identification of salt tolerant bio-draining tree species and suitable co-crops for adoption in highly saline waterlogged areas. *Prosopis juliflora*— a fuel wood species has not been tested under highly saline conditions. May be a combination of trees and sub-surface drainage will be required. Further refinements on these lines are being negotiated with Haryana Government. It will be in a partnership mode. For proper implementation of this technology, it is also necessary to train the foresters, engineers and Command Area Development officials. A training program, accordingly, has been proposed to the Ministry of Water Resources (MoWR), CAD, Govt. of India."

76. When asked whether any of the research findings in respect of the projects relating to utilisation and conservation of Soil and Water undertaken by Institute of ICAR have been patented, the Ministry replied as under:

> "No. Developed technologies are in public domain. State Governments have implemented conservation technologies on 28.5 m ha with 14,577 crores investment since plan period till March 2005. Watershed management is now a transparent participatory process of equity, decentralisation and empowerment of communities. These technologies are being considered to generate employment specifically for the poor, landless and small holders. Assets of trees, grazing lands and livestocks created on the wastelands by harnessing social capital can generate self employment. These development findings do not fall under patentable category."

77. As regards the mechanism for dissemination of the research findings in respect of the projects that were undertaken by ICAR in various parts of the country, the Ministry in their note have stated as under:

> "The main agricultural extension system is operated by the State Governments since it is a state subject. The ICAR has established a network of Krishi Vigyan Kendras (KVK) aiming at technology assessment, refinement and demonstration of technology/products. The activities of the KVK include on-farm trail to identify the location specific technologies under various farming systems, organizing frontline demonstrations on the farmers' fields, training of trainers and limited number of farmers to update their knowledge and skills.
>
> Besides, the research findings emanating from different research projects are disseminated through institute-village link programme, farmers' fairs, exhibitions, *goshthis*, documentary films, extension publications and mass media."

78. The Committee desired to know about the training programmes imparted by ICAR to the research personnel working in the research institutes. In reply, the Ministry have explained the position as under:

> "All recruitees to the position of Scientist in the entry grade of Rs. 8000-13500 initially undergo a mandatory Foundation Course for period of four months at the National Academy of Agricultural Research Management (NAARM, Hyderabad. The course comprises or orientation and capacity building, field experience with rural perspective, exposure to multi-disciplinary research perspective and evaluation. Besides, NAARM regularly conducts short term courses for the senior research management positions to build up their research management capabilities and skills.
>
> As per provisions of the existing Career Advancement Scheme (CAS) of the University Grants Commission (UGC) adopted by the Council with effect from 27.07.1998 any scientist for being placed in the next higher grade has to *inter alia* participate/attend refresher course/summer/winter schools which is either organized/sponsored by the Education division of the ICAR or UGC."

79. On being enquired whether scientists working in ICAR are sent abroad for training, the Ministry replied as under:

> "The Scientists of the ICAR are also deputed for short-term/long-term training/ study visits abroad as per the provisions in the various Memorandum of Understanding/Agreement with various countries and international research institutions including organisation of the consultative groups (CG centres).
>
> The Council deputed 211 scientists abroad under World Bank aided National Agriculture Technology Project (NATP) and 95 scientists under various MoUs and protocols with other countries in various reputed/identified institutions in different priority areas during last three years. The scientists of the council are also free to establish contact with any institution of repute to promote professional competence and are allowed to avail sabbatical leave for a maximum period of one year either within or outside the country."

80. The Committee sought to know whether all the scientists sent abroad returned, after their overseas training. In response, the Ministry replied as under:

> ".....all the scientists deputed for overseas training have returned and resumed their duties. However, there are instances of two scientists in the entry grade who proceeded abroad for acquiring Ph. D/Post Doctoral Fellowship but have not resumed duties so far. The Council has initiated major disciplinary proceedings action against these scientists as per provision of Rule 14 of CCS (CCA) rules as made applicable for the scientists of the Council. In one case the Inquiry Officer is to submit his report shortly and in the other the Inquiry report has been received and the same has been forwarded to the charged officer as per rules. The scientists deputed on various short-term/long-term training courses abroad are governed by the provisions of the MoU/Bilateral Protocol(s) with no liability on the part of council except the admissible pay and allowances of the scientists during the period of training.
>
> The Scientists before proceeding on any specific training abroad execute a bond stating that they shall serve the council for a period of four years from the date of completion of the training, failing which the scientist will have to deposit/ refund the entire amount spent on his salary, subsistence allowance, the rupee equivalent of the value of fellowship availed, the international air fare etc. as applicable in the specific case."

Observations and Recommendations

81. The Natural Resource Management Division in the Indian Council of Agricultural Research is responsible for research on conservation, improvement and efficient utilisation of soil and water in the country. To accomplish these tasks, five research institutes of Indian Council of Agricltural Research are engaged in the research activities in these areas. The National Bureau of Soil Survey and Land Use Planning, Nagpur is engaged in conducting soil survey and mapping the soils of the country to promote scientific and optimal land pedology, soil survey, land evalution and land use planning. The Indian Institute of Soil Science, Bhopal had been set up for conducting basic and strategic research on soils, especially physical, chemical and biological processes related to management of utrients, water and energy and for developing advanced technologies for sustainable systems of input management in soils. For basic and applied research for developing strategies for salinity control, reclamation and management of salt affected soils, the Central Soil Salinity Research Institute, was established at Karnal. In order to conduct basic and applied research for developing strategies for efficient utilisation of on-farm water resources so as to enhance agricultural productivity on sustainable basis, the Water Technology Centre for Eastern Region was set up at Bhubaneshwar. With a view to control land degradation under all primary production systems, rehabilitation of degraded lands, updating technology in soil and water conservation, watershed development and its management and undertaking water harvesting measures the Central Soil and Water Conservation Research and Training Institute was set up in Dehradun.

82. The Committee are concerned to note that a review of the management of in-house projects, sponsored projects and externally aided projects undertaken and completed over the last five years by the aforesaid five institutes for utilisation and conservation of soil and water with reference to the milestones and achievements of objectives and benefits derived from them has revealed a number of deficiencies in the system. These included non-maintenance of project files by two Research Institutes namely National Bureau of Soil Survey and Land Use Planning, Nagpur and Central Soil and Water Conservation Research and Training Institute, Dehradun as required under rules resulting in inadequate monitoring of the project by Staff Research Council/Research Advisory Committee. Many research projects were concluded with non-achievement/partial achievement of objectives despite time overruns. Technologies developed were not transferred to the end users thereby defeating the ultimate objective of dissemination. Further, there was underperformance in soil survey, mapping of salt affected soils and documentation of traditional wisdom. These issues have been discussd in detail in the following paragraphs.

83. The Committee regret to point out that National Bureau of Soil Survey and Land Use Planning, (NBSS&LUP), Nagpur terminated 15 projects before their completion during 1999-2004. What is surprising is the fact that no records were maintained for 10 completed projects and in 16 projects, Research Project Files were maintained intermittently. The Ministry have attributed these deficiencies to the fact that in some cases the concerned project investigators handling the particular project were deployed for other priority work where their involvement was felt most essential

such as National Agricultural Technology Project work, due to which these principal investigators could not make noticeable progress in their regular projects and hence RPFs were not prepared. As regards, improper maintenance of National Register of Soil Series by the Institute, the Ministry have stated that the register could not be updated as all the scientists remained busy in accomplishing the task of mega project on Soil Resource Mapping and NATP mission mode projects. The Committee are not convinced by these arguments put forth by the Ministry in the defence of NBSS & LUP, Nagpur. In the absence of proper maintenance of Research Project Files and National Register of Soil Series, effectiveness of monitoring of Research activities by Staff Research Council, Research Advisory Committees cannot be ensured. Obviously the Institute has not paid sufficient attention to these vital areas. The ICAR had also failed to monitor such basic activities of the Institute which ultimately affected the functioning of the Institute. At this stage the Committee cannot but emphasise that suitable steps need to be taken to ensure that Research Project Files and all other such documents including National Register of Soil Series are properly maintained.

84. Another area of concern in the working of National Bureau of Soil Survey and Land Use Planning (NBSS&LUP) is the fact that it could not achieve the objectives of Soil Survey, mapping of Land Use planning in three projects involving total expenditure of Rs. 6.63 crores. In these three projects there were partial achievement of objectives and delay in completion ranged from three months to seven years. Soil Survey Reports were not prepared even after lapse of five to twenty-five years although conducting soil surveys and publishing report for land use planning was one of the mandates of this Institute. A Project was undertaken in collaboration with CSSRI, Karnal, in May 1996 on "Preparation of soil resource inventory of coastal salt affected areas of West Bengal and Orissa using satellite imagery and characterization and classification of the soil to determine their potentialities, problems and management" at an outlay of Rs. 16 lakh was to be completed by December 2006 whereas the stipulated period of completion was two years. In another project on "Identification, characterization and delineation of agro economic constraints of oilseed based production systems in rain fed eco system" taken up from July 2000 to February 2003 at an estimated cost of Rs. 55.41 lakhs studies were conducted for four crops in sixteen districts as against the target of six crops in nineteen districts. Further data on area and production by oil seed conducted only in six districts as against twenty-eight different districts. Even in the sixteen districts covered, no strategies for improving the productivity of rainfed oilseed crops were suggested. The rainfed oilseed based production zones were also not delineated using Geographical Information System. Thus, the benefits of improving the productivity of rainfed oilseeds could not be derived. In the third project on "Land use planning for management of agricultural resources" from January 2001 to December 2003, only Rs. 5.92 crore were spent against the allocation of Rs. 9.32 crore as of March 2004.

From the above it is evident that aforesaid three projects were undertaken by the Institute of National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), Nagpur without proper perception, Planning and preliminary background work leading to unjustifiable delays, non-achievement of targets and under utilisation of funds. The Committee are inclined to conclude that delay in completion of these

projects deprived the beneficiaries of the intended benefits. As these are the only three projects test checked by the Audit, the Committee are of the view that there might be more such projects undertaken by these Institutes where there could have been similar delays and non-achievement of the laid down targets. The Committee desire that these Institutes should show the requisite urgency in completion of the projects within the stipulated periods and should take all necessary measures to ensure that the objectives laid down under the projects are fully and timely achieved.

85. In respect of working of Central Soil Salinity Research Institute, Karnal the Committee have noticed that there were partial achievement of objectives in two projects undertaken during the period 1999-2004. An externally aided Indo-United Kingdom collaborative research project on "Soil salinity and breeding of salt resistant crops (soil salinity and breeding for salt resistant crops rice, Indian mustard and gram)" was undertaken by the Institute in March, 1996 for five years at a total cost of Rs. 5.63 crore. The scrutiny has revealed that two of the six scientists who went abroad in connection with the project did not contribute anything and there was a delay of about three years in completion of this project. The Ministry have informed the Committee that the two scientists in question have submitted their deputation reports in November 1997 and January 1998 respectively and the final report of the project was submitted in November, 2004. The Committee however, have not been informed as to why the two scientists submitted their reports late and what action was taken by the Institute against them. It is, thus, clear that the delay in submission of deputation Reports by the two scientists led to delay in overall completion of the project. The Committee desire that a system ought to be put in place to ensure that the scientists who are sent abroad submit their Reports timely and deterrent action should be taken against those who do not comply with the instructions in this regard. In another project namely "Management of salt affected soils and use of saline water in Agriculture", in which the institute spent Rs. 7.19 crore during 1999-2004, the benchmark suvey for quality control of ground water was undertaken from 1972 only in Guntur district of Andhra Pradesh, but no strategy had been formulated as yet to solve the water problems of that area. Further no benchmark surveys were carried out at centres other than Guntur district. In this connection, the Ministry have intimated that the water problems of the coastal belt of Guntur area have been solved through studies on Doruvu Technology and this technology had found favours with the farmers in the coastal belt. A number of benchmark sites have been identified in various irrigation commands in Uttar Pradesh, Andhra Pradesh, Madhya Pradesh, Tamil Nadu and Haryana and so on where the temporal changes in diffierent benchmark sites are being studied with a view to make possible land use planning. The Committee hope that expeditious steps would be taken to study conditions of these sites to make their best use for agriculture requirements.

86. Another instance where there has been partial achievement of objectives relates to two projects undertaken by the Indian Institute of Soil Science, Bhopal, IISS undertook a project on "Organic pools and dynamics in relation to land use tillage and agronomic practices for maintenance of soil fertility" in May 2000 with Bhopal as lead centre along with six co-operating centres at an estimated cost of

Rs. 1.08 crore to be completed by December 2003. The project was extended upto March 2004 with additional outlay of Rs. 3.14 lakh and was aimed to quantify the changes in soil organic Carbon and Nitrogen pools to assess the mineralisation potential and C-sequestration in soils of semi-arid and sub humid regions and to fit experimental data in different models of C-sequestration. Rs. 36.42 lakh was spent on this project by IISS till its completion. Completion report of the project revealed that the project was implemented only in seven out of targeted eleven districts. Further due to delay in procurement of Carbon Hydrogen Nitrogen Sulphur analyser and Furriar Transform Infrared Spectrophotometer, the chemical analysis of the project was hampered. Due to non-materialisation of training of two scientists in the USA in modelling of Soil Organic Matter (SOM) and recent technique in SOM dynamics and measurements, one of the objectives of fitting of experimental data in different models of C-sequestration could not be achieved.

IISS also undertook a project on "Integrated Nutrient Management in major pulse based cropping system and identification of the most productive and remunerative systems" from May 2000 to March 2004 with Bhopal as lead centre. Against the total provision of Rs. 30.66 lakh an expenditure of Rs. 18.83 lakh was incurred. The project involved six important cropping systems at different locations. The final report of the project revealed that experiments on three cropping systems were not conducted and experiments on another cropping system were not conducted in two out of four locations. Consequently, the objective of identifying the most productive and remunerative pulses based cropping system under different soil and nutrient management could not be achieved. The Committee are constrained to point out that this project was undertaken without giving due consideration to the cropping sequences prevalent in the targeted districts resulting in revision of the technical programme after two years of starting the project. The Committee hope that suitable lessons would be drawn by the Institute/ ICAR from these projects and due care would be taken in future to ensure timely completion of the projects and for achievement of broad objectives.

87. In case of Water Technology Centre for Eastern Region, Bhubaneshwar also the targeted results in three projects costing Rs. 48.90 lakh could not be acheived resulting in non-achievement of the objective of sustainable agricultural production through development of strategies for effective management of on-farm water resources. Similarly, Central Soil & Water Conservation Research and Training Institute, Dehradun did not achieve the objectives of research in soil and water conservation measures and land use systems for sustainable crop production in three projects costing Rs. 37.90 lakh. The Committee are not convinced by the explanation given by the Ministry for non-achievement of targeted results in respect of these projects. With a little bit of proper advance planning and farsightedness these projects could have been properly and timely executed.

A review of the working of the aforesaid five institutes has reveal that there was lack of proper planning, execution and monitoring of some of the research projects undertaken. Consequently, there was time and cost overruns, leading to partial/ non-achievement of objectives and targets laid, defeating in the process the very purpose for which these projects were conceived for implementation. The various

deficiencies/shortcomings that have been noticed points to the lack of effective institutionalized monitoring mechanism either at ICAR or at the Ministry level. The Committee recommend that ICAR should streamline/strengthen their monitoring mechanism so that the projects are reviewed periodically and it is ensured that the same are completed properly and expeditiously. If necessary ICAR/Ministry may put in place requisite mechanism for the same.

88. Another disquieting feature of the functioning of these institutes is the fact that in all sixteen technologies involving a total cost of about Rs. 2.44 crore that were developed in the fields of water and soil conservation by the four institutes of Indian Council of Agricultural Research, namely Central Soil Salinity Research Institute, Water Technology Centre for Eastern Region, Central and Indian Institute of Soil Science have not been transferred to the end-users *i.e* farmers. The Committee regret to observe that despite spending large funds for research activities in the field of agriculture, the benefits of technologies developed by the various institutes have not percolated down to the end users in whose name research is being carried out.

The Ministry have stated that Indian Council of Agricultural Research develops technologies, demonstrates and passes onto the line departments and also trains the farmers. An autonomous body namely Agriculture Technology Management Agency (ATMA) had been set up which serves as a focal point for integrating research and extention activities at the district level. One of the key activities of ATMA is to prepare a Strategic Research and Extension Plan and its implementation by the various stakeholders. Indian Council of Agricultural Research has also established a network of Krishi Vigyan Kendras to aim at technology assessment, refinement and demonstration of technology/products. The Krishi Vigyan Kendras network is further interfaced with State Agricultural Universities through their Directors of Extension. It has further been stated that the technology transfer was also undertaken through lab to land programme, Institute village link programmes, and farmers fairs, visits and Goshtis etc. However, the Ministry have admitted that poor linkages and coordination between the Institute and users had resulted in poor transfer of technologies. Despite setting up of Krishi Vigyan Kendras and Agriculture Technology Management Agency it is quite evident that these institutional mechanisms have miserably failed and as a result the benefits of Agricultural Research could not reach the farmers. The Committee are of the opinion that labours of research will come to naught, unless its fruits reach end users. The Committee desire that whatever steps that are required to strengthen the system should be taken so that the technologies reach the end users. For this if necessary, the Ministry may study the feasibility of setting up of State level Agricultral Research Extension Committees comprising representatives of Ministry of Agriculture, Indian Council of Agricultural Research, State Government Officials, Farmers Associations, and Non-Government Organisations involved in Agricultural Extension etc. for effective coordination and supervision of various activities relating to transfer of technologies/ research inputs developed by various Agriculture Research Institutes to the farmers.

NEW DELHI:
15 February, 2007
26 Magha 1928 (Saka)

PROF. VIJAY KUMAR MALHOTRA
Chairman,
Public Accounts Committee

ANNEXURE-I

NON-TRANSFER OF TECHNOLOGY

(Rs. in lakh)

Sl. No.	Name of Institute	Purpose of the technology	Particulars of technology developed	Cost
1.	Central Soil Salinity Research Institute, Karnal	(i) Proper resources characterization and classification of soil, land evaluation and land use planning	Soil site suitability maps for Bara tract area for different crops	14.08
		(ii) To solve the water logging problems	Bio drainage to control the water logging in development of secondary salinisation of canal irrigated soils	28.94
		(iii) To formulate design of sub-surface drainage system in waterlogged alkali soils	Process of waterlogged alkali soils which would economise the reclamation were prepared	4.10
2.	Water technology centre for Eastern Region, Bhubaneshwar	(i) To optimize 40 lakh ha. of waterlogged shallow low land	Fish-crop rotational cropping technology	6.00
		(ii) For conservation of water	Drip irrigation method for selected vegetables	6.03
		(iii) Providing irrigation to undulating levels of plateau are as of eastern India and bring a wide change in productivity, production and income in addition to run off control	Design of low cost proof channels and tanks and runoff cycling based irrigation system	5.43

Sl. No.	Name of Institute	Purpose of the technology	Particulars of technology developed	Cost
		(iv) For saving of water and different sowing dates	Process of suitable week for sowing green gram in paddy fallows and in receding soil moisture	6.75
		(v) For conservation of excess rain water	Optimum dike height	21.92
		(vi) Conducting demonstrations at three locations under different soil conditions	Moisture conservation and weed suppression package for pointed gourd.	20.00
3.	Central Soil and Water Conservation Research and Training Institute (CSWCR&TI) Dehradun	(i) To assess the effect of various conservation measures on runoff, soil and nutrients loss To evaluate the comparative of different conservation on the yield of sorghum crop	The vegetative barrier of vetiver grass was alone able to arrest the runoff and soil erosion problem more effectively.	2.93
		(ii) To determine the effect of perennial pigeon pea as a vegetative barrier on soil and water losses and production in Ragi, Kodomillet and lentil sequences	The hedge row of perennial pigeonpea was declared as quite effective and the effect of fixed row cropping of various combinations of Ragi, Kodomillet and perennial pigeonpea on biomass, grain production and Ragi.	2.36
		(iii) To find out suitable crops practices which permit minimum soil and nutrients loss and maximize the return	Sorghum+Vetiver had drastically reduced the soil loss indicating its suitability as best choice for crop with Vetiver to conserve the soil most effective. Sorghum has also higher production in quantity per ha. as compared to blackgram.	2.52

Sl. No.	Name of Institute	Purpose of the technology	Particulars of technology developed	Cost
		To work out the crop management factor ('c' of USLE for selected crops grown in the region)		
		(iv) To find out the suitable maize harvesting methods for maximum wheat production	Wheat production was increased when ploughing was done immediately after maize harvest and soil was covered with maize stover	4.50
4.	Indian Institute of Soil Science (IISS), Bhopal	(i) To enrich manurial value particularly sulphur and nitrogen content of compost	Enrich compost production	16.92
		(ii) For enhancing and sustaining productivity and soil health in soyabean-wheat system in Malwa region	Integrated plant nutrient supply (INPS) for soyabean-wheat system	31.50
		(iii) To determine the Nitrogen requirement in the absence or presence of Farm Yard Manure (FYM) and green manure without any loss in yield and soil fertility	Integrated Nutrient Management (INM) for pulse and oilseed.	69.88
			Total	243.86

APPENDIX-I

CHAPTER II: INDIAN COUNCIL OF AGRICULTURAL RESEARCH

Management of projects relating to utilisation and conservation of soil and water undertaken by Institutes of ICAR

Highlights

* NBSS&LUP, Nagpur could not achieve objectives of soil survey, mapping and land use planning in three projects involving an expenditure of Rs. 6.63 crore. Soil Survey reports were not prepared even after lapse of five to 25 years.
* IISS, Bhopal did not achieve the desired results in soil science research in two projects, despite expenditure of Rs. 55.25 lakh.
* CSSRI, Karnal could not solve effectively the issues relating to reclamation and management of alkaline and saline soils in two projects costing Rs. 12.82 crore. Map of salt affected soils of India was also not prepared.
* In water management research, WTCER, Bhubaneshwar failed to accomplish targeted results in three projects costing Rs. 36.39 lakh resulting in non-achievement of the objective of sustainable agricultural production through management of canal water, rain water and waterlogged land.
* CSWCR&TI, Dehradun did not achieve the objectives of research in soil and water conservation measures and land use systems for sustainable crop production in three projects costing Rs. 37.90 lakh.
* Technologies developed in 16 projects at a cost of Rs. 2.44 crore were not transferred to end users.

2.1 Introduction

Natural Resource Management Division of Indian Council of Agricultural Research (ICAR) is responsible for research on conservation, improvement and efficient utilisation of soil and water. Five research institutes of ICAR are engaged in research in these areas. Areas of research undertaken by them are as under:

Sl. No.	Name of Institute	Research areas
1.	National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), Nagpur	Soil survey and mapping the soils of the country to promote scientific and optimal land pedology, soil survey, land evaluation and land use planning.
2.	Indian Institute of Soil Science (IISS), Bhopal	Basic and strategic research on soil, especially physical, chemical and biological processes related to management of nutrients, water and energy and developing advanced technologies for sustainable systems of input management in soils.

Sl. No.	Name of Institute	Research areas
3.	Central Soil Salinity Research Institute (CSSRI), Karnal	Basic and applied research for developing strategies for salinity control, reclamation and management of salt affected soils.
4.	Water Technology Centre for Eastern Region (WTCER), Bhubaneshwar	Basic and applied research for developing strategies for efficient utilisation of on-farm water resources to enhance agricultural productivity on sustainable basis.
5.	Central Soil & Water Conservation Research and Training Institute (CSWCR&TI), Dehradun	Research and development of strategies for controlling land degradation under all primary production systems, rehabilitation of degraded lands, updated technology in soil and water conservation, watershed development and its management and undertaking water harvesting measures.

2.2 Scope and objectives of audit

The present review, covering the period 1999-2000 to 2003-04, includes observations on management of the projects undertaken to utilise and conserve soil and water through test check of in-house projects, sponsored projects and externally aided projects undertaken and completed by five institutes with reference to the milestones and achievements of objectives and benefits to be derived from them.

2.3 National Bureau of Soil Survey and Land Use Planning (NBSS&LUP), Nagpur

NBSS&LUP, Nagpur completed 45 projects and terminated 15 projects before their completion during 1999-2004. Of the completed projects, research project files were available for 19 projects only which were examined in audit.

2.3.1 Improper maintenance of project files

In accordance with the byelaws, rules and regulations of ICAR and instructions issued by ICAR from time to time, Research Project files (RPFs) are required to be maintained in three parts. The research project proposal is to be kept in RPF-I, which is to be presented to Staff Research Council (SRC) for approval. Annual progress of each project is to be kept in RPF-II, for review by SRC to evaluate the implementation of the project. The final report in the form of RPF-III is required to be prepared and presented to SRC and Research Advisory Committee (RAC) for overall review and evaluation of the project. However, NBSS&LUP did not maintain the RPFs properly in respect of the projects implemented during 1999-2004. In case of 15 projects, which were dropped midway. RPF-I only were available. As such reasons for termination of the projects before their completion were not ascertainable. Besides, no records were maintained for 10 completed projects. In 16 projects, RPFs were maintained intermittently. In the absence of proper maintenance of RPFs, effectiveness of monitoring of research activities by SRC/RAC cannot be ensured.

NBSS&LUP stated in August 2004 that in future proper maintenance of RPFs would be ensured.

2.3.2 Non-achievement of objectives

In three projects, partial achievements of objectives and delay in completion ranging from three months to seven years were noticed. These are discussed below:

(a) In collaboration with CSSRI, Karnal, NBSS&LUP undertock a project in May 1996 on "Preparation of soil resource inventory of coastal salt affected areas of West Bengal and Orissa using satellite imagery and characterization and classification of the soil to determine their potentialities, problems and management" at an outlay of Rs. 16 lakh for a period of two years.

However, the project was continued even after the stipulted duration of two years. SRC recommended in November 2000 to complete the project by 2001. Ignoring the advice of SRC, the project was continued as of July 2004. The annual progress reports of the project were not prepared regularly. In the annual progress report for 2002-03, it was mentioned that due to pressure of other projects, the work of this project could not progress as per the schedule and the likely date of completion was determined as December 2005. ICAR stated in December 2004 that extension of the project up to December 2005 was accepted by SRC and added that the work was in progress and would be completed. ICAR did not, however, indicate the remedial measures instituted to address the delays.

(b) NBSS&LUP, Nagpur undertook a project on "Identification, characterization and delineation of agro-economic constraints of oilseed based production systems in rainfed eco-system" from July 2000 to February 2003 at an estimated cost of Rs. 55.41 lakh. The project was to facilitate identification of the appropriate sowing time for specified areas and suggest strategies for improving the productivity of rainfed oilseed crops. The rainfed oilseed based production zones were to be delineated using Geographical Information System (GIS).

The final report of the project revealed that studies were conducted for four crops in 16 districts as against the target of six crops in 19 districts. Further, data on area and production of oilseeds were collected only in six districts as against 28 different districts targeted. Even in the 16 districts covered, no strategies for improving the productivity of rainfed oilseed crops were suggested. The rainfed oilseed-based production zones were also not delineated using GIS. Thus, the benefits of improving the productivity of rainfed oilseeds could not be derived.

ICAR stated in December 2004 that against the target of 19 districts for six crops, 16 districts for four crops were covered as suggested by the Scientific Advisory Panel and added that the data collected was processed to generate maps depicting the oil seed production potential and constraints and were presented in different thematic maps. However, it did not furnish the reasons for collection of data only in six districts as against 28 districts as per the project proposal.

(c) ICAR sanctioned a project on "Land use planning for management of agricultural resoruces" from January 2001 to December 2003 at a cost of Rs. 9.32 crore.

The project aimed at developing the strategies and options for rational and scientific land use plan at watershed level.

The project was extended up to December 2004. The progress reports of the project up to March 2004 revealed that due to delay in receipt of funds, activities like procurement of equipment, socio-economic survey, resource survey, different kinds of mapping and crop experiment could not be completed as planned. The economic analysis of alternate land uses to assess overall socio-economic aspect was not started as of July 2004. Linkages with various organizations like International Crop Research Institute for Semi Arid Tropics and CSSRI on various aspects such as fish varieties for coastal areas, animal component suitable for coastal eco-system and technologies for different crop components of land use models for coastal eco-system were yet to be developed. Further, field experiments for cereals and pulses crops, development of soil site suitability for different land use types, selection of suitable cropping system specific to each agro-ecological zone and monitoring of soil and water qualities were yet to be completed to achieve the aim of the project. Against the allocation of Rs. 9.32 crore, only Rs. 5.92 crore was spent as of March 2004.

ICAR stated in December 2004 that the work had already been started to conduct economic analysis and alternate land uses to assess overall socio-economic-aspect and that activities were also simultaneously initiated to assess the data for horticultural validation, development of soil site suitability criteria, suggesting different crop/ cropping sequence in specific agro-ecozone. However, the reply is silent about the linkages to be developed with other institutes as envisaged in the project.

2.3.3 Non-submission of survey reports

Conducting soil survey and publishing reports for land use planning was one of the mandates of NBSS&LUP. Twenty five field survey reports were pending for periods ranging from five to 25 years. It was observed that field surveys of the districts of Chittur, Mysore and Chitradurga were conducted partly in 1976 but were not completed fully. As such the soil survey reports were not submitted till August 2004. As a result, the objective of land use planning was not achieved fully.

ICAR, while accepting the facts, stated in December 2004 that the survey work undertaken before 1986 was suspended and complete manpower was put on national project on soil resource mapping work. It added that the pending soil survey reports would be complted by August 2005.

2.3.4 Costing of soil surveys

The cost of each survey was required to be worked out with reference to staff salaries, travelling cost, depreciation of vehicles and related overheads, cost of base maps, cost laboratory analysis, cartography work and cost of map publication.

However, NBSS&LUP did not work out the cost the the surveys though it surveyed 25 States covering a total area of 2,90,577,440 hectare, five districts in the States of Bihar, Himachal Pradesh, Karnataka covering an area of 20,00,530 hectare, 11 research farms covering an area of 9800 heactare and 13 wastershed command area covering the area of 2,90,125 hectare during 1997-98 to 2001-02.

ICAR stated in December 2004 that the costing of survey would be worked out for future projects.

2.3.5 Improper maintenance of national register of soil series

A national register was required to be maintained for identification of soil series along with their salient characteristics and classification. Indices according to states and crops raised on the soil series are also to be prepared for ready reference. However, the national register was not updated NBSS&LUP did not furnish information on the year from which the register was to be updated. To complete this task, correlation of soil series identified so far was required to be completed. Quinquenniel Review Team (QRT) observed that there was a backlog of correlation of more than a thousand identified soil series.

ICAR stated in December 2004 that national register of soil series was temporarily suspended due to national mission project on soil resource mapping of different states on 1:2,50,000 scale and of the country on 1:1 million scale initiated in 1986. It added that state wise soil series had been registered and correlated for 13 States. For the remaining States the work was in progress. However, it did not furnish the timeframe for completion of the task.

2.4 Indian Institute of Soil Science, Bhopal

During the period 1999-2004 IISS Bhopal completed 36 projects, of which 19 projects were test checked. In two project the objectives were achieved only partially. Apart from this, technologies developed in three projects at a total cost of Rs. 1.18 crore were not transferred to the end-users as listed in *Annexrue.* ICAR did not furnish reasons for non-transfer of technologies to the end-users.

2.4.1 Non-achievement of objectives

(a) IISS undertook a project on "Organic pools and dynamics in relation to land use tillage and agronomic practices for maintenance of soil fertility" in May 2000 as lead centre with six co-operating centres at an estimated cost of Rs. 1.08 crore to be completed by December 2003. The project was extended up to March 2004 with additional outlay of Rs. 3.14 lakh. The project was aimed to quantify the changes in soil organic Carbon and Nitrogen pools to assess the mineralisation potential and C-sequestration in soils of semi-arid and sub humid regions and to fit experimental data in different models of C-sequestration. Rs. 36.42 lakh was spent on this project by IISS till its completion.

Completion report of the project revealed that the project was implemented only in seven out of targeted eleven districts. Due to delay in procurement of Carbon Hydrogen Nitrogen Sulphur analyser and Furrier Transfrom Infrared Spectrophotometer, the chemical analysis of the project was hampered. Due to non-materialisation of training of two scientists in the USA in modelling of Soil Organic Matter (SOM) and recent technique in SOM dynamics and measurements, one of the obejectives of fitting of experimental data in different models of C-sequestration could not be achieved.

The contention of ICAR of December 2004 that the overall objectives of the project had been achieved is not tenable. The reply of ICAR contradicts the facts stated in the project completion report that chemical analysis of the project was hampered due to non-procurement of equipment and that fitting of data in different models of C-sequestration could not be achieved due to non-materialisation of training of two scientists. Further, ICAR itself had stated that the results could not be obtained for Bhubaneswar and Hyderabad due to discontinuance of long-term fertilizer experiments at those locations as well as inability to carry out solid sample analysis at Anantpur and Jorhat.

(b) IISS undertook a project on "Integrated Nutrient Management in major pulse based cropping system and identification of the most productive and remunerative systems" from May 2000 to March 2004 as lead centre. Against the total provision of Rs. 30.66 lakh an expenditure of Rs. 18.83 lakh was incurred.

The project involved six important cropping system at different locations. The final report of the project revealed that experiments on three cropping systems were not conducted and experiments on another cropping system were not conducted in two out of four locations. Consequently, the objective of identifying the most productive and remunerative pulses based cropping system under different soil and nutrient management could not be achieved.

ICAR stated in December 2004 that since the project had to be executed under farmer's field condition in participatory mode after selecting the farmers and villages in the target districts, the cropping sequences were revised midway after considering the views of the farmers. The reply revealed that this project was undertaken without giving due consideration to the cropping sequences prevalent in the targeted districts resulting in revision of the technical programme after two years of starting the project.

2.5 Central Soil Salinity Research Institute, Karnal

CSSRI, Karnal completed 72 projects during 1999-2004, of which 40 were test checked. In two projects the objectives were achieved partially, which are discussed in the succeeding paragraphs. In three projects, technology developed at a cost of Rs. 47. 12 lakh was not transferred to the end users as listed in *Annexrue.*

2.5.1 Non-achievement of objectives

(a) CSSRI undertook an externally aided Indo-United Kingdom collaborative research project on "Soil salinity and breeding of salt resistant crops (soil salinity and breeding for salt resistant crops-rice, Indian mustard and gram)" in March 1996 for five years at a total cost of Rs. 5.63 crore. Scrutiny revealed that six scientists of CSSRI visited United Kingdom in the first year of the project and undertook studies on alkaline soil instead of both alkaline and saline soils. The progress report for 1996-97 revealed that two of the six scientists who were abroad in connection with the project did not contribute anything. The final report was not yet prepared as of June 2004.

ICAR while accepting that the projects include both saline and alkaline soils stated in December 2004 that all scientists contributed to achieve the project objectives and that the final report was being prepared. The reply has to be viewed in the light of

the fact that the progress reports clearly revealed non-contribution by the two scientists and the final report was yet to be prepared even after a lapse of three years from the completion of the project.

(b) All India coordinated research project on "Management of salt affected soils and use of saline water in agriculture" was implemented from 1972 at the coordinating unit at CSSRI, Karnal alongwith seven centres at SAUs and one at Agriculture College, Agra.

Rs. 7.19 crore was spent on the project during 1999-2004. The benchmark survey for quality control of ground water was undertaken from 1972 only in Guntur district of Andhra Pradesh, but, no strategy had been formulated as yet to solve the water problems of that area. Thus one of the objectives of evaluating the effect of poor quality water on soils and crops was limited to only one region. Apart from this, there was unspent balance of Rs. 1.02 crore accumulated with the centres over the years due to non-adjustment of previous years' unspent balance while releasing further grants to them.

ICAR's reply of December 2004 was silent about the fact why no benchmark surveys were carried out at centres other than Guntur as well as on high accumulation of unspent balances at coordinating centres.

2.5.2 Non-preparation of maps of salt affected soils

RAC in its meeting held in February 2000 recommended preparation of maps for total affected areas of the country to know the latest position of the country's salt affected areas. It recommended that CSSRI should undertake this task of identification to have a final and authentic record. ICAR was to coordinate with different agencies to prepare this map upon a single figure. However, no time frame had been fixed to complete the task. The action taken report revealed that the map of salt affected soils on 1: 2,50,000 scale for Bihar, Haryana, Orissa, Karnataka, Madhya Pradesh, Punjab, Uttar Pradesh and West Bengal had been prepared, But for the remaining States, no work was started as yet.

ICAR stated in December 2004 that the preparation of the maps was delayed since most of the maps were designated as restricted by Survey of India and it required considerable time to get clearance from the Ministry of Defence prior to their procurement from Survey of India. The contention is not a valid ground for delay, since the clearance issue is forseeable and could be resolved in time.

2.5.3 Non-documentation of traditional wisdom

The RAC recommended in February 2000 to refine and update the traditional agricultural practices being followed in different parts of the country. Various traditional practices like soil-reclamation, land use, water management, nutrient management etc. were to be collected and documented CSSRI did not take any action on this issue as of June 2004.

ICAR stated in December 2004 that due to constraints of non-availability of scientific personnel, documenting the traditional wisdom was not taken up in detail

and the study would be conducted in future. It added that some information on traditional wisdom was collected from the Gujarat region.

2.6 Water Technology Centre for Eastern Region, Bhubaneshwar

WTCER, Bhubaneshwar completed 28 projects during 1999-2004, of which 20 projects were test checked. In three projects, partial achievements of objectives were noticed and are discussed in the succeeding paragraphs. WTCER, Bhubaneshwar did not transfer to the end users the technology developed at a total cost of Rs. 66.13 lakh in six projects as listed in annexute. ICAR stated in December 2004 that efforts were being made to transfer the technology to the users.

2.6.1 Non-achievement of objectives

(a) In order to formulate an integrated water and nutrient management strategy for sustainable productivity of the eastern region by studying influence of water regimes on soil chemical environment and availability of nutrients, WTCER undertook a project on "Nutrient dynamics in soils under different water management practices" in November 1998 and completed in November 2001 after an expenditure of Rs. 21.61 lakh.

The final report of the project revealed that soil samples were collected only from two districts of Orissa instead of major soil groups from different benchmark sites as envisaged in the project. WTCER did not undertake micronutrient studies (Zinc and Iron) as planned since the Atomic Absorption Spectrophotometer costing Rs. 15.10 lakh was installed at the fag end of the project in August 2001 and was made operational only in March 2002 after completion of the project. Thus, achievement was limited to that extent.

ICAR stated in December 2004 that micronutrient studies could not be undertaken due to delay in receipt and installation of Atomic Absorption Spectrophotometers.

(b) WTCER undertook a project on "Mitigation of water logging from deltaic low land rice eco-system for enhancing agricultural productivity" in 1998. The duration of the project was five years at an estimated cost of Rs. 19.29 lakh. The objectives of the project were *inter alia* to design and develop suitable technology for rice-fish integration and to study the socio-economic feasibility of the prescribed technologies. The long-term objectives were to provide a sustainable technology package for the deltaic low land rice eco-system for increase in agricultural productivity. This integrated package in combination with aquaculture was expected to be a viable alternative for utilisation of rainfed low land of 20.5 million ha. whichwas prone to water logging.

The final report of the project revealed that after studying only one aspect of rice-fish integration and an expenditure of Rs. 6.78 lakh, the project was prematurely closed in 2000. Thus, an integrated package as planned was not developed. WTCER stated in July 2004 that the principal investigator and one co-investigator were granted study leave and another investigator was transferred. It was decided to carry out the project with modified objectives as per the SRC's decision. Thus, an integrated package as a viable alternative for combating water logging in deltaic low land rice eco-system was not developed.

(c) WTCER undertook a project on "Studies on agro-meteorological parameters for evolving sustainable crop production strategies in selected location of eastern region" from January 1998 to January 2002. The objectives of the project were to compile agro-meteorological parameters to study the agro-climatic feasibility of crop production in West Bengal, Orissa, Bihar, eastern part of Uttar Pradesh, northern Madhya Pradesh, north Andhra Pradesh, Assam and the adjacent States, to analyse initial conditional probability of rainfall for evolving sustainable crop production strategy in those locations and to characterize drought periods and critical dry spell in respect of agricultural crop production on the basis of water balance and rainfall probability.

The final report of the project revealed that WTCER collected and compiled the data of selected zones of Orissa and West Bengal only. Since these two locations were not sufficient for evolving any strategy for crop production, the project was merged with another project titled "Appraisal of resources base and identification of land, water, climate and socio-economic constraints in managing water resources for agricultural development in eastern India" in July 2000. In spite of the merger, the earlier project started in January 1998 was continued without any activity and declared completed in January 2002 after an expenditure of Rs. eight lakh. However, even after merging the project no work was undertaken for evolving crop production strategies for different agro-climatic zones of eastern India as envisaged.

ICAR stated in December 2004 that owing to the constraints in technical manpower, the project was planned to cover selected locations of eastern India that represented different agro-climatic zones of Orissa and West Bengal. The reply highlights weakness in management of human resources. As a result the crop production strategies for whole of eastern India could not be evolved.

2.7 Central Soil and Water Conservation Research and Training Institute, Dehradun

CSWCR&TI, Dehradun completed 86 projects during 1999-2000 to 2003-04, of which 16 projects, where project records were maintained, were test checked. Shortcomings noticed are detailed in succeeding paragraphs. CSWCR&TI, Dehradun did not transfer to the end-users the technology developed in four projects at a total cost of Rs. 12.31 lakh as listed in Annexure.

2.7.1 Improper maintenance of project files

CSWCR&TI, Dehradun did not maintain research project files in respect of 70 projects. In the absence of such files, it is not clear how SRC/RAC evaluated and monitored the project.

2.7.2 Non-achievement of objectives

(a) CSWCR&TI undertook a project on "Appraisal/investigation of surface and sub-surface water harvesting systems in the Nilgiris and adjoining lower hills" from 1996 to 2000 at a total expenditure of Rs. 4.10 lakh. The objectives of the project were *inter alia* to study the hydrologic response in terms of hydrologic process controls and channel flow across different spatial scales (size of watersheds) and land users in

Nilgiris, to suggest rainfall catchment area and pond capacity relationship and hydrologic budgeting of ponds.

The final report of the project revealed that hydrologic budgeting of ponds was not discussed, evidencing that no activity was undertaken in this area.

ICAR stated in December 2004 that the study was discontinued as the ponds had higher outflow than inflow which could not be correctly accounted for as these types of ponds were not only fed by surface runoff but also by spring (sub-surface). Therefore the hydrologic budgeting could not be carried out. The reply of ICAR has to be viewed in light of the fact that investigation was to be conducted both for surface and sub-surface water systems.

(b) CSWCR&TI, Dehradun undertook a project on "Methodologies for development and analysis of watersheds and decision support systems for interventions" from October 1999 to December 2003 at a total cost of Rs. 5.13 lakh. The project aimed to collect data on nine watersheds in the Shiwaliks and to develop methodology for optimising land use patterns in the watersheds leading to sustainable development.

The final report of the project revealed that methodology for development and analysis of watershed could not be developed due to lack of inter-disciplinary team. Thus, the aim of the project was not achieved.

ICAR accepted the audit observations.

(c) CSWCR&TI, Dehradun undertook a project on "Development and evaluation of soil and water conservation measures and land use systems for sustainable crop production in Western Ghats of coastal region" from June 2000 to September 2003 at an outlay of Rs. 52.15 lakh. The project was taken up for evolving and testing different bio-engineering measures of soil and water conservation, water harvesting system, water management alternatives and suitable land use systems prevalent in the region. The project was implemented at State Horticulture farm in Tamil Nadu, which represents the low elevation and high rainfall zone of the Western Ghats.

The final report of the project revealed that conclusions could not be drawn because the experiment was conducted with newly planted perennial crops like cardamom, pepper, mandarin orange, bush pepper and tea which would take at least four to five years for yielding. The project was, therefore, continued from October 2003 to March 2004 as in-house project. Thus, the benefit of evolving and testing different bio-engineering measures of soil and water conservation could not be derived even after an expenditure of Rs. 28.67 lakh.

ICAR stated in December 2004 that due to closure of the project in September 2003 by Agro-Eco Directorate (Coastal) of National Agricultural Technology Project, the project could run only for three years. Further, due to termination of senior research fellow and the experiment site being located at a faraway place from the research centre, the experiments could not be carried out and had to be conducted in its own farm. It added that had the project been continued up to August 2004, data for three years could have been collected and conclusions drawn on the initial establishment and growth of crops.

ANNEXURE

Non-transfer of technology

(Rupees in lakh)

Sl. No.	Name of Institute	Purpose of the technology	Particulars of technology developed	Cost
1.	Central Soil Salinity Research Institute, Karnal	(i) Proper resources characterization and classification of soil, land evaluation and land use planning	Soil site suitability maps for Bara tract area for different crops	14.08
		(ii) To solve the water logging problems	Bio-drainage to control the water logging in development of secondary salinisation of canal irrigated soils	28.94
		(iii) To formulate design of sub-surface drainage system in waterlogged alkali soils	Process of waterlogged alkali soils which would economise the reclamation were prepared	4.10
2.	Water Technology Center for Eastern Region, Bhubaneshwar	(i) To optimize 40 lakh ha. of waterlogged shallow low land	Fish-crop rotational cropping technology	6.00
		(ii) For conservation of water	Drip irrigation method for selected vegetables	6.03
		(iii) Providing irrigation to undulating levels of plateau areas of eastern India and bring a wide change in productivity, production and income in addition to run off control	Design of low cost proof channels and tanks and run-off cycling based irrigation system	5.43
		(iv) For saving of water and different sowing dates	Process of suitable week for sowing green gram in paddy fallows and in receding soil moisture	6.75
		(v) For conservation of excess rain water	Optimum dike height	21.92
		(vi) Conducting demonstrations at three location under different soil conditions.	Moisture conservation and weed suppression package for pointed gourd.	20.00

Sl. No.	Name of Institute	Purpose of the technology	Particulars of technology developed	Cost
3.	Central Soil and Water Corservation Research and Training Institute (CSWCR&TI) Dehradun	(i) To assess the effect of various conservation measures on runoff, soil and nutrients loss To evaluate the comparative of different conservation on the yield of sorghum crop	The vegetative barrier of vetiver grass was alone able to arrest the runoff and soil erosion problem more effectively	2.93
		(ii) To determine the effect of perennial pigeon pea as a vegetative barrier on soil and water losses and production in Ragi, Kodomillet and lentil sequences	The hedge row of perennial pigeon was declared as quite effective and the effect of fixed row cropping of various combinations of Ragi, Kodomillet and perennial pigeon on biomass, grain production and Ragi.	2.36
		(iii) To find out suitable crops practices which permit minimum soil and nutrients loss and maximize the return. To work out the crop management factor (of USLE for selected crops grown in the region)	Sorghum +Vetiver had drastically reduced the soil loss indicating its suitability as best choice for crop with Vetiver to conserve the soil most effective, Sorghum has also higher production in quantity per ha. as compared to blackgram.	2.52
		(iv) To find out the suitable maize harvesting methods for maximum wheat production	Wheat production was increased when ploughing was done immediately after maize harvest and soil was covered with maize stover.	4.50
4.	Indian Institute of Soil Science (IISS), Bhopal	(i) To enrich manurial value particularly sulphur and nitrogen content of compost	Enrich compost production	16.92
		(ii) For enhancing and sustaining productivity and soil health in soybean wheat system in Malwa region	Integrated plant nutrient supply (INPS) for soybean-wheat system	31.50
		(iii) To determine the Nitrogen requirement in the absence or presence of farm yard manure (FYM) and green manure wit hout any loss in yield and soil fertility	Integrated nutrient management (INM) for pulse and oilseed.	69.88
			Total	243.86

APPENDIX II

STATEMENT OF OBSERVATIONS AND RECOMMENDATIONS

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
1.	81	Agriculture (Department of Agricultural Research and Education)	The Natural Resource Management Division in the Indian Council of Agricultural Research is responsible for research on conservation, improvement and efficient utilisation of soil and water in the country. To accomplish these tasks, five research institutes of Indian Council of Agricultural Research are engaged in the research activities in these areas. The National Bureau of Soil Survey and Land use Planning, Nagpur is engaged in conducting soil survey and mapping the soils of the country to promote scientific and optimal land pedology, soil survey, land evaluation and land use planning. The Indian Institute of Soil Science, Bhopal had been set up for conducting basic and strategic research on soils, especially physical, chemical and biological processes related to management of nutrients, water and energy and for developing advanced technologies for sustainable systems of input management in soils. For basic and applied research for developing strategies for salinity control, reclamation and management of salt affected soils, the Central Soil Salinity Research Institute, was established at Karnal. In order to conduct basic and applied research for developing strategies for efficient utilisation of on-farm water resources so as to enhance agricultural productivity on sustainable basis, the Water Technology Centre for Eastern Region was set up at Bhubaneshwar. With a view to control land degradation under all primary production systems, rehabilitation of degraded lands, updating technology in soil and water conservation, watershed development and its management and undertaking water harvesting measures the Central Soil and Water Conservation Research and Training Institute was set up in Dehradun.
2.	82	-do-	The Committee are concerned to note that a review of the management of in-house projects, sponsored projects and externally aided projects undertaken and completed over the last five years by the aforesaid five institutes for utilisation and

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
			conservation of soil and water with reference to the milestones and achievements of objectives and benefits derived from them has revealed a number of deficiencies in the system. These included non-maintenance of project files by two Research Institutes namely National Bureau of Soil Survey and Land Use Planning, Nagpur and Central Soil and Water Conservation Research and Training Institute, Dehradun as required under rules resulting in inadequate monitoring of the project by Staff Research Council/Research Advisory Committee. Many research projects were concluded with non-achievement/partial achievement of objectives despite time overruns. Technologies developed were not transferred to the end users thereby defeating the ultimate objective of dissemination. Further, there was underperformance in soil survey, mapping of salt affected soils and documentation of traditional wisdom. These issues have been discussed in detail in the following paragraphs.
3.	83	Agriculture (Department of Agricultural Research and Education)	The Committee regret to point out that National Bureau of Soil Survey and Land Use Planning, (NBSS&LUP), Nagpur terminated 15 projects before their completion during 1999—2004. What is surprising is the fact that no records were maintained for 10 completed projects and in 16 projects, Research Project Files were maintained intermittently. The Ministry have attributed these deficiencies to the fact that in some cases the concerned project investigators handling the particular project were deployed for other priority work where their involvement was felt most essential such as National Agricultural Technology Project work, due to which these principal investigators could not make noticeable progress in their regular projects and hence RPFs were not prepared. As regards, improper maintenance of National Register of Soil Series by the Institute, the Ministry have stated that the register could not be updated as all the scientists remained busy in accomplishing the task of mega project on Soil Resource Mapping and NATP mission mode projects. The Committee are not convinced by these

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
			arguments put forth by the Ministry in the defence of NBSS & LUP, Nagpur. In the absence of proper maintenance of Research Project Files and National Register of Soil Series, effectiveness of monitoring of Research activities by Staff Research Council, Research Advisory Committees cannot be ensured. Obviously the Institute has not paid sufficient attention to these vital areas. The ICAR had also failed to monitor such basic activities of the Institute which ultimately affected the functioning of the Institute. At this stage the Committee cannot but emphasise that suitable steps need to be taken to ensure that Research Project Files and all other such documents including National Register of Soil Series are properly maintained.
4.	84	Agriculture (Department of Agricultural Research and Education)	Another area of concern in the working of National Bureau of Soil Survey and Land Use Planning (NBSS&LUP) is the fact that it could not achieve the objectives of Soil Survey, mapping of land Use planning in three projects involving total expenditure of Rs. 6.63 crores. In these three projects there were partial achievement of objectives and delay in completion ranged from three months to seven years. Soil Survey Reports were not prepared even after lapse of five to twenty-five years although conducting soil surveys and publishing report for land use planning was one of the mandates of this Institute. A Project was undertaken in collaboration with CSSRI, Karnal, in May 1996 on "Preparation of soil resource inventory of coastal salt affected areas of West Bengal and Orissa using satellite imagery and characterization and classification of the soil to determine their potentialities, problems and management" at an outlay of Rs. 16 lakh was to be completed by December 2006 whereas the stipulated period of completion was two years. In another project on "Identification, characterization and delineation of agro economic constraints of oilseed based production systems in rainfed eco system" taken up from July 2000 to February 2003 at an estimated cost of Rs. 55.41 lakhs studies were conducted for four crops in sixteen districts as against the target of six crops in nineteen districts.

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
			Further data on area and production by oil seeds conducted only in six districts as against twenty-eight different districts. Even in the sixteen districts covered, no strategies for improving the productivity of rainfed oilseed crops were suggested. The rainfed oilseed based production zones were also not delineated using Geographical Information System. Thus, the benefits of improving the productivity of rainfed oilseeds could not be derived. In the third project on "Land use planning for management of agricultural resources" from January 2001 to December 2003, only Rs. 5.92 crore were spent against the allocation of Rs. 9.32 crore as of March 2004. From the above it is evident that aforesaid three projects were undertaken by the Institute of National Bureau of Soil Survey and Land use Planning (NBSS&LUP), Nagpur without proper perception, planning and preliminary background work leading to unjustifiable delays, non-achievement of targets and under utilisation of funds. The Committee are inclined to conclude that delay in completion of these projects deprived the beneficiaries of the intended benefits. As these are the only three projects test checked by the Audit, the Committee are of the view that there might be more such projects undertaken by these Institutes where there could have been similar delays and non-achievement of the laid down targets. The Committee desire that these Institutes should show the requisite urgency in completion of the projects within the stipulated periods and should take all necessary measures to ensure that the objectives laid down under the projects are fully and timely achieved.
5.	85	Agriculture (Department of Agricultural Research and Education)	In respect of working of Central Soil Salinity Research Institute, Karnal the Committee have noticed that there were partial achievement of objectives in two projects undertaken during the period 1999-2004. An externally aided Indo-United Kingdom collaborative research project on "Soil salinity and breeding of salt resistant crops (soil salinity and breeding for salt resistant crops rice, Indian mustard and gram)" was undertaken by the Institute in

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
			March, 1996 for five years at a total cost of Rs. 5.63 crore. The scrutiny has revealed that two of the six scientists who went abroad in connection with the project did not contribute anything and there was a delay of about three years in completion of this project. The Ministry have informed the Committee that the two scientists in question have submitted their deputation reports in November 1997 and January 1998 respectively and the final report of the project was submitted in November, 2004. The Committee however, have not been informed as to why the two scientists submitted their reports late and what action was taken by the Institute against them. It is, thus, clear that the delay in submission of deputation Reports by the two scientists led to delay in overall completion of the project. The Committee desire that a system ought to be put in place to ensure that the scientists who are sent abroad submit their Reports timely and deterrent action should be taken against those who do not comply with the instructions in this regard. In another project namely "Management of salt affected soils and use of saline water in Agriculture", in which the institute spent Rs. 7.19 crore during 1999-2004, the benchmark survey for quality control of ground water was undertaken from 1972 only in Guntur district of Andhra Pradesh, but no strategy had been formulated as yet to solve the water problems of that area. Further no benchmark surveys were carried out at centres other than Guntur district. In this connection, the Ministry have intimated that the water problems of the costal belt of Guntur area have been solved through studies on Doruvu Technology and this technology had found favours with the farmers in the coastal belt. A number of benchmark sites have been identified in various irrigation commands in Uttar Pradesh, Andhra Pradesh, Madhya Pradesh, Tamil Nadu and Haryana and so on where the temporal changes in different benchmark sites are being studied with a view to make possible land use planning. The Committee hope that expeditious steps would be taken to study conditions of these sites to make their best use for agriculture requirements.

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
6.	86	Agriculture (Department of Agricultural Research and Education)	Another instance where there has been partial achievement of objectives relates to two projects undertaken by the Indian Institute of Soil Science, Bhopal. IISS undertook a project on "Organic pools and dynamics in relation to land use tillage and agronomic practices for maintenance of soil fertility" in May 2000 with Bhopal as lead centre along with six co-operating centres at an estimated cost of Rs. 1.08 crore to be completed by December 2003. The project was extended up to March 2004 with additional outlay of Rs. 3.14 lakh and was aimed to quantify the changes in soil organic Carbon and Nitrogen pools to assess the mineralisation potential and C-sequestration in soils of semi-arid and sub humid regions and to fit experimental data in different models of C-sequestration. Rs. 36.42 lakh was spent on this project by IISS till its completion. Completion report of the project revealed that the project was implemented only in seven out of targeted eleven districts. Further due to delay in procurement of Carbon Hydrogen Nitrogen Sulphur analyser and Furrier Transform Infrared Spectrophotometer, the chemical analysis of the project was hampered. Due to non-materialisation of training of two scientists in the USA in modelling of Soil Organic Matter (SOM) and recent technique in SOM dynamics and measurements, one of the objectives of fitting of experimental data in different models of C-sequestration could not be achieved. IISS also undertook a project on "Integrated Nutrient Management in major pulse based cropping system and identification of the most productive and remunerative systems" from May 2000 to March 2004 with Bhopal as lead centre. Against the total provision of Rs. 30.66 lakh an expenditure of Rs. 18.83 lakh was incurred. The project involved six important cropping systems at different locations. The final report of the project revealed that experiments on three cropping systems were not conducted and experiments on another cropping system were not conducted in two out of four locations. Consequently, the objective of identifying the most productive and remunerative pulses based cropping system under different soil

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
			and nutrient management could not be achieved. The Committee are constrained to point out that this project was undertaken without giving due consideration to the cropping sequences prevalent in the targeted districts resulting in revision of the technical programme after two years of starting the project. The Committee hope that suitable lessons would be drawn by the Institute/ICAR from these projects and due care would be taken in future to ensure timely completion of the projects and for achievement of broad objectives.
7.	87	Agriculture (Department of Agricultural Research and Education)	In case of Water Technology Centre for Eastern Region, Bhubaneshwar also the targeted results in three projects costing Rs. 48.90 lakh could not be achieved resulting in non-achievement of the objective of sustainable agricultural production through development of strategies for effective management of on-farm water resources. Similarly, Central Soil & Water Conservation Research and Training Institute, Dehradun did not achieve the objectives of research in soil and water conservation measures and use systems for sustainable crop production in three projects costing Rs. 37.90 lakh. The Committee are not convinced by the explanation given by the Ministry for non-achievement of targeted results in respect of these projects. With a little bit of proper advance planning and farsightedness these projects could have been properly and timely executed. A review of the working of the aforesaid five institutes has revealed that there was lack of proper planning, execution and monitoring of some of the research projects undertaken. Consequently, there was time and cost overruns, leading to partial/non-achievement of objectives and targets laid, defeating in the process the very purpose for which these projects were conceived for implementation. The various deficiencies/shortcomings that have been noticed points to the lack of effective institutionalized monitoring mechanism either at ICAR or at the Ministry level. The Committee recommend that ICAR should streamline/strengthen their monitoring

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
			mechanism so that the projects are reviewed periodically and it is ensured that the same are completed properly and expeditiously. If necessary ICAR/Ministry may put in place requisite mechanism for the same.
8.	88	Agriculture (Department of Agricultural Research and Education)	Another disquieting feature of the functioning of these institutes is the fact that in all sixteen technologies involving a total cost of about Rs. 2.44 crore that were developed in the fields of water and soil conservation by the four institutes of Indian Council of Agricultural Research, namely Central Soil Salinity Research Institute, Water Technology Centre for Eastern Region, Central and Indian Institute of Soil Science have not been transferred to the end-users *i.e.* farmers. The Committee regret to observe that despite spending large funds for research activities in the field of agriculture, the benefits of technologies developed by the varous institutes have not percolated down to the end users in whose name research is being carried out. The Ministry have stated that Indian Council of Agricultural Research develops technologies, demonstrates and passes onto the line departments and also trains the farmers. An autnomous body namely Agriculture Technology Management Agency (ATMA) had been set up which serves as a focal point for integrating research and extension activities at the district level. One of the key activities of ATMA is to prepare a Strategic Research and Extension Plan and its implementation by the various stakeholders. Indian Council of Agricultural Research has also established a network of Krishi Vigyan Kendras to aim at technology assessment, refinement and demonstration of technology/products. The Krishi Vigyan Kendras network is further interfaced with State Agricultural Universities through their Directors of Extension. It has further been stated that the technology transfer was also undertaken through lab to land programme, Institute village link programmes, and farmers fairs, visits and goshtis etc. However, the Ministry have admitted that poor linkages and coordination between the Institute and

Sl. No.	Para No.	Ministry/ Department	Observations/Recommendations
			users had resulted in poor transfer of technologies. Despite setting up of Krishi Vigyan Kendras and Agriculture Technology Management Agency it is quite evident that these institutional mechanisms have miserably failed and as a result the benefits of Agricultural Research could not reach the farmers. The Committee are of the opinion that labours of research will come to naught, unless its fruits reach end-users. The Committee desire that whatever steps that are required to strengthen the system should be taken so that the technologies reach the end users. For this, if necessary, the Ministry may study the feasibility of setting up of State level Agricultural Research Extension Committees comprising representatives of Ministry of Agriculture, Indian Council of Agricultural Research, State Government Officials, Farmers Associations, and Non-Governmental Organisations involved in Agricultural Extension etc. for effective coordination and supervision of various activities relating to transfer of technolgies/research inputs developed by various Agriculture Research Institutes to the farmers.

MINUTES OF THE SIXTEENTH SITTING OF THE PUBLIC ACCOUNTS COMMITTEE (2005-2006) HELD ON 5TH JANUARY, 2006

The Committee sat from 1630 hrs. to 1730 hrs. on 5th January, 2006 in Committee Room "C", Parliament House Annexe, New Delhi.

PRESENT

Prof. Vijay Kumar Malhotra — *Chairman*

MEMBERS

Lok Sabha

2. Shri Raghunath Jha
3. Shri Magunta Sreenivasulu Reddy
4. Dr. R. Senthil
5. Dr. Ramlakhan Singh
6. Shri Tarit Baran Topdar

Rajya Sabha

7. Shri R.K. Dhawan
8. Dr. K. Malaisamy
9. Shri V. Narayanasamy
10. Shri Jairam Ramesh
11. Prof. R.B.S. Verma

SECRETARIAT

1. Shri S.K. Sharma — *Additional Secretary*
2. Shri Ashok Sarin — *Director*
3. Smt. Anita B. Panda — *Under Secretary*
4. Shri M.K. Madhusudhan — *Under Secretary*

Officers of the office of the Comptroller and Auditor General of India

1. Shri U. Bhattacharya — ADAI
2. Shri R.P. Singh — Pr. Director

Representatives of the Ministry of Agriculture (Department of Agricultural Research & Education) and Indian Council of Agricultural Research

1. Dr. Mangala Rai — Secretary (DARE) and Director-General ICAR
2. Smt. Sushma Nath — Additional Secretary (DARE)

3. Dr. Rita Sharma	—	Additional Secretary and FA (DARE/ICAR)
4. Dr. J.S. Samra	—	Deputy Director-General (NRM), ICAR
5. Shri H.C. Pathak	—	Director (Finance-ICAR)
6. Dr. V.N. Sharda	—	Director, CSWCR&TI, Dehradun
7. Dr. K.S. Gajbhiye	—	Director , NBSS&LUP, Nagpur
8. Dr. P.D. Sharma	—	Assistant Director-General (Soils)
9. Dr. A. Subba Rao	—	Director, IISS, Bhopal
10. Dr. Gurbachan Singh	—	Director, CSSRI, Karnal
11. Dr. Ashwini Kumar	—	Director, WTCER, Bhubaneshwar

2. At the outset, the Chairman, PAC welcomed the Members and Audit Officers and greeted everyone on the occasion of New Year. The Officers of the Office of C&AG of India briefed the Committee on the specific points arising out of Chapter-II of Audit Report No. 5 of 2005 (Scientific Department) regarding "Management of projects relating to utilization and conservation of Soil and Water undertaken by institutes of ICAR".

3. Thereafter, the representatives of the Ministry of Agriculture (Department of Agricultural Research & Education) were called in. The Secretary, Department of Agricultural Research and Education gave a brief account of the achievements made by the Research Institutes under ICAR and also explained the factual position with regard to Audit findings. The Committee then sought clarifications on some points to which the representatives of the Ministry could not give satisfactory replies.

4. After some discussion, Chairman directed the representatives of Ministry of Agriculture to furnish the requisite information in writing on all the queries for which the witnesses could not give proper replies. Since the discussion remained inconclusive, the Committee decided to meet again to take further evidence on the subject.

5. A copy of the verbatim proceedings of the sitting has been kept on record.

The Committee then adjourned.

MINUTES OF THE TWENTIETH SITTING OF THE PUBLIC ACCOUNTS COMMITTEE (2006-2007) HELD ON 13TH FEBRUARY, 2007

The Committee sat from 1030 hrs. to 1315 hrs. on 13th February, 2007 in Committee Room "B", Parliament House Annexe, New Delhi.

PRESENT

Prof. Vijay Kumar Malhotra — *Chairman*

MEMBERS

Lok Sabha

2. Shri Khagen Das
3. Shri P.S. Gadhavi
4. Shri Raghunath Jha
5. Shri Bhartruhari Mahtab
6. Shri Brajesh Pathak
7. Shri Magunta Sreenivasulu Reddy
8. Shri Rajiv Ranjan 'Lalan' Singh
9. Shri K.V. Thangka Balu
10. Shri Tarit Baran Topdar

Rajya Sabha

11. Shri Prasanta Chatterjee
12. Dr. K. Malaisamy
13. Shri Ravula Chandra Sekar Reddy

SECRETARIAT

1. Shri Ashok Sarin — *Director*
2. Shri M.K. Madhusudhan — *Under Secretary*
3. Shri Ramkumar Suryanarayanan — *Assistant Director*

Officers of the office of the Comptroller and Auditor General of India

1. Shri B.K. Chattopadhyay — ADAI (Reports Central)
2. Dr. A.K. Banerjee — DGACR
3. Shri A.N. Chatterjee — Director-General (Performance Audit)

2. At the outset, the Chairman welcomed the Members and Audit officials to the sitting of the Committee. The Committee then took up for consideration the following draft Reports and adopted the same without any modifications/amendments.

(i) Draft Report on "Management of Projects relating to utilization and conservation of Soil and Water undertaken by institutes of ICAR" and

(ii) ** ** **

The Committee authorised the Chairman to finalise these Reports in the light of verbal and consequential changes arising out of factual verification by Audit or otherwise and to present the same to Parliament.

3. ** ** **

4. A copy of the verbatim proceedings of the sitting has been kept on record.

The Committee then adjourned.

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8.	M/s. Sangam Book Depot, LG-3, Akarshan Bhawan, 23, Ansari Road, Darya Ganj, New Delhi-110002.
9.	M/s. Biblia Impex Pvt. Ltd. 2/18, Ansari Road, New Delhi-110002 (T. No. 23262515).
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11.	M/s. Seth & Co. Room No. 31 D, Block-B, Delhi High Court, Sher Shah Road, New Delhi-110003.
12.	M/s. Dhanwantra Medical & Law House, 592, Lajpat Rai Market, Delhi-110006. (T. No. 23866768).
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