ANNUAL REPORT
2001-2002

Government of India
Ministry of Water Resources
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FUNCTIONS AND ORGANISATIONAL SET UP OF THE MINISTRY

HIGHLIGHTS

● Shri Arjun Charan Sethi is the Union Minister of Water Resources since 29.05.2000.

● Smt. Bijoya Chakravarty is the Union Minister of State for Water Resources since 13.10.1999.

● Shri B.N. Navalawala took over as Secretary (Water Resources) on 31.03.2001.

● Smt. Radha Singh took over as Additional Secretary (Water Resources) on 01.11.2001.
CHAPTER 1

FUNCTIONS AND ORGANISATIONAL SET UP OF THE MINISTRY

FUNCTIONS AND SET UP

The Ministry of Water Resources is responsible for laying down policy guidelines and programmes for the development and regulation of country's water resources. The Ministry is responsible for the following functions:-

(a) Overall planning, policy formulation, coordination and guidance in the sector of water resources.

(b) Technical guidance, scrutiny, clearance and monitoring of the irrigation, flood control and multi-purpose projects (major/medium) of the States.

(c) Infrastructural, technical and research support for sectoral development at the State level.

(d) Providing special central financial assistance for specific projects and assistance in obtaining external assistance from the World Bank and other agencies.

(e) Overall policy formulation, planning and guidance in respect of minor irrigation and command area development, and also the administration and monitoring of the centrally sponsored schemes in these areas.

(f) Overall planning for the development of ground water resources, establishment of utilisable resources and formulation of policies of exploitation, overseeing of and support to the State level activities in ground water development.

(g) Formulation of the national water development perspective and determination of the water balance of different basins/sub-basins for possible inter-basin transfers.

(h) Coordination, mediation and facilitation in regard to the resolution of differences or disputes relating to inter-state rivers and overseeing of the implementation of inter-state projects.

(i) Operation of the central network for flood forecasting and warning on inter-state rivers, the provision of central assistance for some State schemes in special cases and preparation of flood control master plans for the Ganga and the Brahmaputra river systems.

(j) Negotiations with the neighbouring countries, like Bangladesh, Nepal and
Pakistan, in regard to river waters, water resources development projects and the operation of the Indus Water Treaty.

THE MINISTRY OF WATER RESOURCES

Shri Arjun Charan Sethi is the Union Minister of Water Resources since 29.05.2000. Smt. Bijoya Chakravarty is the Minister of State for Water Resources since 13.10.1999. Shri B.N. Navalawala is the Secretary in the Ministry of Water Resources since 31.03.2001.

The work of the Ministry is divided among the eight wings; namely, Administration, Finance, Policy and Planning, Project, Eastern Rivers, Indus, Command Area Development, and Water Management & Minor Irrigation. Each Wing is headed by an officer of the level of Joint Secretary. The functions of these wings are as follows:

ADMINISTRATION WING

The Administration Wing is responsible for cadre management of the Central Water Engineering (Group 'A') Service, cadre management of CSS/ CSCS/ CSSS posts in the Ministry as well as its attached offices, matters concerning personnel in the Central Ground Water Board, matters relating to All India Service officers in the Ministry, training of officers and staff, all matters relating to ground water development, annual report and annual action plan of the Ministry, Information Technology, Parliamentary Consultative Committee, Implementation of the Official Language Act, vigilance, redressal of public grievances and monitoring the implementation of the reservation policy for Scheduled Castes/Scheduled Tribes, OBCs and physically handicapped persons, security matters, staff welfare activities and matters relating to general administration.

FINANCE WING

The Finance Wing is mainly responsible for monitoring expenditure on various plan/ non-plan schemes, giving advice on financial proposals, preparation of budget, revised estimates, performance budget, work measurement studies and audit objections etc.

The accounting set up of the Ministry is headed by the Controller of Accounts and comprises the Principal Accounts Office with six Pay & Accounts Offices, three located in New Delhi and one each in Faridabad, Pune and Farakka. The Controller of Accounts is assisted by two Deputy Controllers of Accounts and seven Pay & Accounts Officers.

The Controller of Accounts office compiles the complete monthly account on computer. All statements like the expenditure statement, Appropriation Accounts, Finance Accounts, SCT etc. and a booklet "Accounts at a Glance" of the Ministry are prepared on computer. The monthly salary bills of the staff are also generated on computer. Further, this office is also equipped with new computers in the field of accounts working on LAN & ORACLE in the new software CONTACT. Now mostly all the accounting job work including the Bank Module is done in the new software and
accordingly reports are being generated.

POLICY AND PLANNING WING

All policy matters relating to the development of water resources, preparation of five-year plans, annual plans, Twenty Point Programme, administrative matters relating to the Narmada Control Authority, Sardar Sarovar Construction Advisory Committee, matters relating to Sardar Sarovar Project, Central Water and Power Research Station, Central Soil and Materials Research Station, New Delhi and the National Institute of Hydrology, Roorkee are being handled in the Policy and Planning Wing. It also looks after external assistance for water resources projects from the international funding agencies.

PROJECT WING

The Project Wing is responsible for policy matters concerning inter-state issues, disputes about waters of inter-state rivers except Ravi-Beas waters, Sutlej Water and Yamuna Water disputes. It is also responsible for all administrative and technical matters relating to (i) Narmada Control Authority, (ii) Sardar Sarovar Construction Advisory Committee, (iii) Farakka Barrage Project, (iv) Betwa River Board, (v) Bansagar Control Board, (vi) Tungabhadra Board, (vii) M/s National Projects Construction Corporation Limited, (viii) M/s Water & Power Consultancy Services (India) Limited and (ix) National Water Development Agency. Matters relating to irrigation and multipurpose projects in various States, including release of Central Loan Assistance to States under the Accelerated Irrigation Benefits Programme are also looked after by this wing.

EASTERN RIVERS WING

This Wing deals with matters relating to the Ganga and Brahmaputra basins and in particular, international aspects of cooperation and development of Water Resources with Bangladesh, Nepal, Bhutan and China including implementation of the Ganga Waters Sharing Treaty (1996) with Bangladesh. It also deals with matters relating to the Ganga Flood Control Commission, Patna and the Brahmaputra Board, Guwahati. Matters concerning flood management and sea erosion of the entire country are handled in this Wing.

INDUS WING

This Wing is mainly responsible for implementation of the Indus Waters Treaty, 1960 with Pakistan. In addition, matters concerning sharing of Ravi-Beas waters, Ravi-Beas Waters Tribunal, Sutlej-Yamuna Link Canal, Indira Gandhi Canal Project, sharing of Yamuna Waters upto Okhla, and Ganga waters upto Haridwar, Upper Yamuna River Board and Upper Yamuna Review Committee, Delhi Water Supply and Flood Control and Drought Management are being handled by this Wing.

COMMAND AREA DEVELOPMENT WING

The Command Area Development (CAD) Wing is concerned with the implementation of the centrally sponsored Command Area
Development Programme. The responsibilities of the CAD Wing include monitoring the progress of the works under the Programme, release of central assistance to the States, promoting participatory irrigation management, training of farmers and officials in CAD related activities, action research programmes and adaptive trials etc.

It also implements the centrally sponsored scheme of Rationalisation of Minor Irrigation Statistics, including census of minor irrigation structures, with a view to creating a reliable data.

**WATER MANAGEMENT WING**

The Water Management (WM) Wing of the Ministry of Water Resources is responsible for the implementation of The World Bank assisted Hydrology Project in nine States and five Central agencies. A project Coordination Secretariat for coordinating, monitoring, administrating and managing the implementation of the Project has been set-up in the WM Wing. The wing also monitors the implementation of the World Bank assisted Water Resources Consolidation Projects, currently under implementation in the State of Haryana, Tamilnadu and Orissa. Besides, the wing is also dealing with issues related to Water and Land Management Institutes (WALMIs) in different States, and the Water Quality Assessment Authority (WQAA).
The fourth meeting of the National Water Resources Council (NWRC) was held on 07.07.2000 to consider the revised draft National Water Policy and draft National Policy Guidelines for water allocation amongst the States.

To achieve greater convergence and agreement on contentious issues, the NWRC decided to constitute a Working Group of Ministers of all the States/Union Territories under the Chairmanship of the Union Minister of Water Resources. The Working Group was constituted on 09.10.2000.

The first meeting of the Working Group of NWRC was held on 22nd May, 2001. A Core Group comprising seven members representing the States of Andhra Pradesh, Bihar, Goa, Karnataka, Rajasthan, Tamil Nadu and Punjab, headed by the Minister of State for Water Resources was formed in the meeting. The meeting of the Core Group was held on 19th June, 2001.

The second meeting of the Working Group of NWRC was held at Vigyan Bhavan, New Delhi on 24th September, 2001. The report of the Core Group meeting was presented by Mrs. Bijoya Chakravarty, Minister of State for Water Resources.
Recognizing water as a precious national asset, the National Water Policy adopted in 1987 embodies the Nation’s resolve that planning and development of water resources would be governed by National Perspectives. The policy recognizes the drainage basin as the basic unit of planning for development of water resources, and calls for appropriate measures to optimize utilization of this resource not only for the benefit of the people living in the basin, but also for transfer of surplus waters to meet the requirements of areas which have shortage of water. The principal elements of the policy are recounted below:

- Water is a precious national resource and its development should be governed by national perspectives;
- The available resources, of both surface and ground water, should be made utilizable to the maximum extent;
- The unit of planning should be a hydrological unit such as a drainage basin or sub-basin;
- Appropriate organisations should be established for planned development and management of river basins;
- Water should be made available to areas where there is a shortage by transfer from other areas, including transfers from one river basin to another, after taking into account the requirements of the basins;
- Planning of projects for development of water resources should, as far as possible, be for multiple benefits based on an integrated and multidisciplinary approach having regard to human and ecological aspects and special needs of disadvantaged sections of the society; in the allocation of water, ordinarily first priority should be for drinking water, with irrigation, hydro/ power, industrial and other uses following in that order; groundwater potential should be periodically reassessed and its exploitation regulated with reference to recharge possibilities and considerations of social equity;
- Due care should be taken right from the project planning stage to promote conjunctive use of surface water and groundwater;
- Maintenance, modernization and safety of structures should be ensured through proper organizational arrangements;
- There should be close integration of water use and land use policies, and distribution of water should be with due regard to equity and social justice;
● Efficiency of utilization should be improved in all the diverse uses of water, and conservation consciousness promoted through education, regulation, incentives and disincentives;

● Water rates should be such as to foster motivation for economy in use, and should cover maintenance and operational charges and a part of the fixed costs;

● Farmers should be progressively involved in the management of irrigation systems;

● In flood control and management, the strategy should be to reduce the intensity of floods by sound watershed management, adequate flood cushioning in water storage projects wherever feasible, and having an extensive flood forecasting network. Emphasis should also be given on non-structural measures to minimize losses;

● Land erosion by sea or river should be minimized by suitable cost effective measures. Indiscriminate occupation of, and economic activity in, coastal areas and flood plain zones should be regulated;

● Needs of drought-prone areas should be given priority in the planning of projects for development of water resources. These areas should be made less vulnerable through soil moisture conservation measures, water harvesting practices, development of ground water potential and transfer of surface water, where feasible. Modes of land use such as pastures and forestry which demand lesser quantity of water should be encouraged in these areas;

● A national information system on water resources should be established with a network of databanks and data bases integrating and strengthening the existing Central and State level agencies;

● Training and research efforts should be intensified as integral parts of water resources development programmes.

FOLLOW UP ACTION

The Union and the State Governments are taking necessary follow up actions on the recommendations as laid down in the policy. A State Water Policy has been framed by Governments of Kerala, Orissa, Tamilnadu and Uttar Pradesh. Governments of Madhya Pradesh, Bihar and West Bengal have drafted State Water Polices. The Government of Tamilnadu has constituted Water Resources Control and Review Council and has framed the State Water Policy, which has since been adopted by the State Government. The Governments of Gujarat, Mizoram, Lakshadweep, Bihar and Orissa have set up committees for implementation of the Policy in their respective State. The Governments of Arunachal Pradesh, Daman and Diu, Kerala, Lakshadweep, Maharashtra, Haryana, Bihar, Meghalaya, Rajasthan, Nagaland, Mizoram,
Andhra Pradesh, Jammu and Kashmir, Punjab, Himachal Pradesh, Karnataka and Pondicherry have initiated action to follow the policy guidelines. The Government of Himachal Pradesh has stated that they are following the National Water Policy and as such a State Water Policy is not being framed. The Government of Madhya Pradesh has taken up preparation of perspective plans for each river basin. The Government of Goa has prepared a master plan for water resources development. The Government of Mizoram has constituted the Mizoram Water Resources Council for laying down the State Water Policy.

Considering the number of issues/challenges that have emerged in the development and management of water resources since adoption of the National Water Policy in 1987, and the Government’s commitment to have a National Water Policy so that no water goes waste and the water resources are cleaned up, the existing National Water Policy needs to be reviewed and updated. This is not only in the context of existing problems and emerging challenges but also in the light of the experiences of the last several years of its implementation. Some of the important aspects which need to be considered for inclusion in the existing National Water Policy include inter-sectoral water allocations, particularly for diverse uses of water, inter-State river water disputes, water sharing amongst States, multi-sectoral perspectives and a participatory approach towards resources planning and management, private sector participation and integration of quantity, quality and environmental aspects in water resources management, resettlement and rehabilitation of project affected persons, mandatory operation and maintenance funding and related policies for revenue generation and reforms related to legislations, institutions, incentives/disincentives, environment and technology, in the Water Resources Sector.

Accordingly, a draft updated National Water Policy (1998) was formulated and placed before the National Water Resources Council in its 4th meeting held on 7th July, 2000 for consideration and adoption.

**NATIONAL WATER RESOURCES COUNCIL (NWRC)**

The National Water Resources Council (NWRC) was set up by the Government of India in March 1983. The Prime Minister is the Chairman and the Union Minister of Water Resources is the Vice-Chairman of the Council. Some concerned Union Ministries, Chief Ministers of States and the Administrators/Lt. Governors of the Union Territories are Members. The Secretary, Ministry of Water Resources, is the Secretary of the Council. The Functions of the Council are as follows:

- To lay down the national water policy, and to review it from time to time.
- To consider and review water development plans submitted to it by the National Water Development Agency, the River Basin Commissions, etc.
To recommend acceptance of water plans with such modifications as may be considered appropriate and necessary.

To give directions for carrying out such further studies as may be necessary for full consideration of the plans or components thereof.

To advise on the modalities of resolving inter-State differences with regard to specific elements of water plans, and such other issues that arise during planning or implementation of projects.

To advise practices and procedures, administrative arrangements and regulations for the fair distribution and utilization of water resources by different beneficiaries, keeping in view optimum development and the maximum benefits to the people.

To make such other recommendations as would foster expeditious and environmentally sound and economical development of water resources in various regions.

The Council has held four meetings so far. The fourth meeting was held on 7th July, 2000 to consider (1) revised draft National Water Policy and (2) draft National Policy Guidelines for Water Allocation amongst States. There was a consensus among the States on most of the important issues contained in the proposed National Water Policy, but some areas of difference still remained. To achieve greater convergence and agreement on contentious issues of the draft Policy, the Council decided to constitute a Working Group of Ministers of all the States and Union Territories under the Chairmanship of the Union Minister for Water Resources. The draft National Policy Guidelines for Water Allocation amongst States had also been referred to the same Working Group for achieving greater convergence. The first meeting of Working Group of the NWRC was held on 22nd May, 2001. A 'Core Group' comprising seven members representing the States of Andhra Pradesh, Bihar, Goa, Karnataka, Rajasthan, Tamil Nadu and Punjab, headed by the Hon’ble Minister of State (Water Resources), was formed in the meeting. The meeting of the Core Group was held on 19th June, 2001. The meeting was attended by the Ministers of Water Resources/ Irrigation of the States of Bihar, Karnataka, Rajasthan and Tamil Nadu. A representative on behalf of the Minister of Irrigation of Punjab attended the meeting. The States of Goa and Andhra Pradesh were not represented by anyone. The Core Group meeting headed by the Hon’ble Minister of State of Water Resources arrived at consensus on the paragraphs 4.3 and 21.1 of the draft National Water Policy.

The second meeting of the Working Group of NWRC was held at Vigyan Bhawan, New Delhi on 24th September, 2001. The report of the Core Group meeting was presented by Mrs. Bijoya Chakravarty, Minister of State for Water Resources. The Working Group recommended to place the draft National Water Policy (2001) to the NWRC for their consideration during its next meeting.
Regarding the other item, the draft National Policy Guidelines for Water Allocation amongst States, the Working Group recommended that these should be referred to the National Water Board to take a re-look. The fifth meeting of the NWRC is to be convened shortly.

NATIONAL WATER BOARD

To review the progress achieved in implementation of the National Water Policy and to report the progress to the National Water Resources Council from time to time, the Government of India constituted a National Water Board in September, 1990 under the Chairmanship of Secretary (Water Resources). The Secretaries of Union Ministries of Planning, Science & Technology, Agriculture & Cooperation, Rural Areas & Employment, Urban Affairs & Employment, Surface Transport, Environment & Forests, Chairman, Central Water Commission (CWC), Chief Secretaries of States/Union Territories are its Members, and Member (WP&P), CWC, is the Member-Secretary.

The Board has held ten regular and a special meetings so far. In the 10th meeting of the Board held on 29th October, 1998 the draft National Water Policy was discussed. Based on the comments/suggestions of the Members of the Board and Special Invitees, the draft policy was modified, with consensus. It was decided that the draft revised National Water Policy be placed before National Water Resources Council for consideration and approval.

The eleventh meeting of Board is likely to be convened shortly to discuss various Policy related issues along with other routine works.
HIGHLIGHTS

● There are 159 Major and 242 Medium Projects ongoing in the country.

● Created Irrigation Potential in the country is likely to go up to 99.76 m.ha. (million hectares) by the end of 2001-2002 from 22.60 m.ha., which was at the inception of planning in 1951.

● The Irrigation potential likely to Created by the end of 2001-02 would comprise 37.10 m.ha through Major and Medium irrigation and 62.66 m.ha through minor irrigation schemes.
DEVELOPMENT OF IRRIGATION FACILITIES

WATER RESOURCES SITUATION

The annual per capita water availability is estimated to be varying in the range of 300 to 13754 Cubic Metres (Cu.m.), and the national average of annual per capita availability of water is about 1829 Cu.m. in 2001 AD. The per capita availability is likely to decline to about 1557 Cu.m. by 2015 AD due to increase in population. As per well accepted criteria, any situation of water availability of less than 1000 Cubic meters per capita per year is considered as a scarcity condition. Accordingly, 47% of the geographical area and 55% of the population in the country will be under scarcity conditions by 2050AD.

MONSOON RAINFALL

During June to September 2001, 26 out of 35 meteorological sub-divisions covering 63% districts and 82% area of the country received normal to excess rainfall. The country as a whole received 749.70 mm of rainfall against the normal value of 808.7mm (93% of its long period average rainfall) during this period.

RESERVOIR STORAGE

The storage position in 70 important reservoirs in different parts of the country monitored by the Central Water Commission shows a decline at the peak level attained after the monsoon season when compared with the same position last year. Against the designed live capacity at full reservoir levels of 130.60 Thousand Million Cubic meters (TMC) in these reservoirs, the total live storage was 77.10 TMC at the end of September 2001 as against 81.4 TMC at the end of September last year. Compared to the average of last 10 years, this year’s storage was 76% in these reservoirs against 79% in the last year.

IRRIGATION POTENTIAL

Against the reassessed Ultimate Irrigation Potential (UIP) of 139.89 million hectare (m.ha), the created irrigation potential was 22.60 m.ha in 1951 and the same is likely to be 99.76 m.ha(Provisional) by the end of Ninth Plan (1997-2002). Thus, about 71% of the UIP of the country is expected to be harnessed by the end of March, 2002.

MAJOR AND MEDIUM IRRIGATION

The Ultimate Irrigation Potential of the country from Major and Medium irrigation projects has been assessed as 58.46 m.ha. This includes projects with a culturable command area of more than two thousand hectares. The potential created from Major and Medium irrigation sources up to the end of the Seventh Plan (1985-90) was 29.92 m.ha and at the end of the Eighth Five Year Plan (1992-97) was 32.96 m.ha.
Against a target of 9.81 m.ha set for creation of additional potential through Major & Medium projects during the Ninth Plan (1997-2002), irrigation potential of about 4.14 m.ha. is likely to be created during this period, thereby raising the cumulative total of created potential from Major and Medium projects to around 37.10 m.ha (provisional) at the end of the Ninth Plan. The Plan-wise progress of creation of irrigation potential through major and medium irrigation projects and the expenditure incurred is given in Table-2 below:

MAJOR AND MEDIUM PROJECTS

Details of number of projects taken up, projects completed and projects spilled over into the Tenth Plan are given in Table-1 below:

### TABLE-1

<table>
<thead>
<tr>
<th>Status of Projects</th>
<th>Number of Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>Completed in Pre-Plan period</td>
<td>74</td>
</tr>
<tr>
<td>Projects taken up during Plan era till the end of IX Plan</td>
<td>308</td>
</tr>
<tr>
<td>Projects completed during Plan era till the end of IX Plan</td>
<td>149</td>
</tr>
<tr>
<td>Projects Spilling over to X Plan</td>
<td>159</td>
</tr>
</tbody>
</table>

### TABLE-2

CREATION OF IRRIGATION POTENTIAL THROUGH MAJOR & MEDIUM IRRIGATION PROJECTS AND PLAN INVESTMENT OVER SUCCESSIVE PLAN PERIODS

<table>
<thead>
<tr>
<th>Period</th>
<th>Outlay/Expenditure (Rs. crore)</th>
<th>Potential Created During (m. ha)</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Plan Period</td>
<td>Not available</td>
<td>9.70</td>
<td>9.70</td>
</tr>
<tr>
<td>First Plan (1951-56)</td>
<td>376</td>
<td>2.50</td>
<td>12.20</td>
</tr>
<tr>
<td>Second Plan (1956-61)</td>
<td>380</td>
<td>2.13</td>
<td>14.33</td>
</tr>
<tr>
<td>Third Plan (1961-66)</td>
<td>576</td>
<td>2.24</td>
<td>16.57</td>
</tr>
<tr>
<td>Annual Plans (1966-69)</td>
<td>430</td>
<td>1.53</td>
<td>18.10</td>
</tr>
<tr>
<td>Fourth Plan (1969-74)</td>
<td>1242</td>
<td>2.60</td>
<td>20.70</td>
</tr>
<tr>
<td>Fifth Plan (1974-78)</td>
<td>2516</td>
<td>4.02</td>
<td>24.72</td>
</tr>
<tr>
<td>Annual Plans (1978-80)</td>
<td>2079</td>
<td>1.89</td>
<td>26.61</td>
</tr>
<tr>
<td>Sixth Plan (1980-85)</td>
<td>7369</td>
<td>1.09</td>
<td>27.70</td>
</tr>
</tbody>
</table>
MINOR IRRIGATION

All ground water and surface water schemes having culturable command area (CCA) upto 2000 hectares (ha) individually are classified as minor irrigation schemes. Ground water development is primarily done through individual and cooperative efforts of farmers with the help of institutional finance and their own savings. Surface water minor irrigation schemes are generally funded from public sector outlays.

Against the Ultimate Irrigation Potential from minor irrigation works assessed at 81.43 m.ha., the cumulative irrigation potential created through minor irrigation schemes was 56.60 m.ha. upto the end of the Eighth Plan. A target of creating additional potential of 7.24 m.ha. from minor irrigation schemes was set for the Ninth Five year Plan (1997-02). It is anticipated that potential of 6.06 m.ha. would be created during this period. Thus the cumulative total of created irrigation potential from minor irrigation sources is likely to reach 62.66 m.ha by the end of the Ninth Plan.

RATIONALISATION OF MINOR IRRIGATION STATISTICS (RMIS) SCHEME

The Minor Irrigation (Statistics) Division implements the Centrally Sponsored Plan Scheme "Rationalisation of Minor Irrigation Statistics (RMIS)". Under the RMIS scheme a Census of the Minor Irrigation Projects is conducted on quinquennial basis to create a reliable database for planning the development of the Minor Irrigation Sector. The Second Census of Minor Irrigation Projects with reference year 1993-94 has since been completed and the Census Report has been published. A sample survey on Status of Minor Irrigation Schemes with reference year 1998-99 is being conducted in all the States / UTs. Up to September, 2001, 16 States / UTs have completed the sample survey work. In the remaining States/ UTs, the work is in progress. The 3rd Census of Minor Irrigation Projects with reference year 2000-2001 is being conducted in all the States/ UTs. So far, 16 States/ UTs have completed the work relating to printing of schedules/ guidelines as well as training of field staff. The remaining States/ UTs are in the process of printing the Schedules/ guidelines.

Under the RMIS scheme, Statistical Cells have been created in the nodal departments of 24 States/ UTs. These Cells are responsible for collection of Quarterly Progress Reports on development of Minor

<table>
<thead>
<tr>
<th>Plan Period</th>
<th>Annual Schemes</th>
<th>Rate of Growth</th>
<th>Cumulative Schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seventh Plan (1985-90)</td>
<td>11107</td>
<td>2.22</td>
<td>29.92</td>
</tr>
<tr>
<td>Annual Plans (1990-92)</td>
<td>5459</td>
<td>0.82</td>
<td>30.74</td>
</tr>
<tr>
<td>Eighth Plan (1992-97)</td>
<td>*21669</td>
<td>*2.22</td>
<td>*32.96</td>
</tr>
<tr>
<td>Ninth Plan (1997-2002)</td>
<td>**50950.43</td>
<td>**4.14</td>
<td>**37.10</td>
</tr>
</tbody>
</table>

[* Provisional and are subject to change. ** Anticipated. ]
Irrigation Departments which are contributing towards the development of Minor Irrigation and furnish the same to the Ministry of Water Resources. The Officers/Staff posted in the Statistical Cells also help in conduct of Census as well as Sample Survey pertaining to Minor Irrigation Schemes.

### FACTS AT A GLANCE

#### Irrigation Potential

<table>
<thead>
<tr>
<th>Sector</th>
<th>UIP Created upto the end of VIII Plan (1992-97)</th>
<th>Created during IX Plan (1997-2002) (Anticipated)</th>
<th>Anticipated Cumulative potential by the end of IX Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Major &amp; Medium Irrigation</td>
<td>58.46</td>
<td>32.96</td>
<td>4.14</td>
</tr>
<tr>
<td>B. Minor Irrigation</td>
<td>81.43</td>
<td>56.60</td>
<td>6.06</td>
</tr>
<tr>
<td>(i) Surface Water</td>
<td>17.38</td>
<td>10.87</td>
<td>1.56</td>
</tr>
<tr>
<td>(ii) Ground Water</td>
<td>64.05</td>
<td>45.73</td>
<td>4.50</td>
</tr>
<tr>
<td>Grand Total (A+B)</td>
<td>139.89</td>
<td>89.56</td>
<td>10.20</td>
</tr>
</tbody>
</table>

#### Outlay / Expenditure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Major &amp; Medium Irrigation</td>
<td>11107.29</td>
<td>5459.15</td>
<td>21668.95</td>
<td>42959.34</td>
</tr>
<tr>
<td>B. Minor Irrigation</td>
<td>6179.30</td>
<td>3030.07</td>
<td>10524.03</td>
<td>9362.03</td>
</tr>
<tr>
<td>(i) Govt. Sector</td>
<td>3118.35</td>
<td>1680.48</td>
<td>6282.34</td>
<td>9362.03</td>
</tr>
<tr>
<td>(ii) Institutional Sector</td>
<td>3060.95</td>
<td>1349.59</td>
<td>4241.69</td>
<td>-</td>
</tr>
<tr>
<td>Grand Total (A+B)</td>
<td>17286.59</td>
<td>8489.22</td>
<td>32192.98</td>
<td>52321.37</td>
</tr>
</tbody>
</table>
Ultimate Irrigation Potential by Various Sources (Mha)

- Major and Medium Irrigation: 64.05 Mha
- Minor Irrigation (Surface Water): 17.38 Mha
- Minor Irrigation (Ground Water): 58.46 Mha
Annexure -I

State-wise number of Ongoing Irrigation Projects of X Plan
(Spilllover from previous Plans)

**No. of Ongoing Projects**

<table>
<thead>
<tr>
<th>Name of State</th>
<th>Major</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Arunachal Pradesh</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Assam</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Bihar</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>Goa</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Gujarat</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Haryana</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Jammu &amp; Kashmir</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Karnataka</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Kerala</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>45</td>
<td>94</td>
</tr>
<tr>
<td>Manipur</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Mizoram</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nagaland</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Orissa</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Punjab</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Sikkim</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Tripura</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>U.P</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Uttaranchal</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>West Bengal</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>159</td>
<td>242</td>
</tr>
</tbody>
</table>
ANNEXURE-II

Statewise Ultimate Irrigation Potential From Major, Medium And Minor Irrigation

(In thousand hectares)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>States/UTs</th>
<th>Ultimate Irrigation Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Major &amp; Minor Irrigation TOTAL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Irrigation</td>
</tr>
<tr>
<td>1</td>
<td>Andhra Pradesh</td>
<td>5000.00</td>
</tr>
<tr>
<td>2</td>
<td>Arunachal Pradesh</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>Assam</td>
<td>970.00</td>
</tr>
<tr>
<td>4</td>
<td>Bihar *</td>
<td>6500.00</td>
</tr>
<tr>
<td>5</td>
<td>Goa</td>
<td>62.00</td>
</tr>
<tr>
<td>6</td>
<td>Gujarat</td>
<td>3000.00</td>
</tr>
<tr>
<td>7</td>
<td>Haryana</td>
<td>3000.00</td>
</tr>
<tr>
<td>8</td>
<td>Himachal Pradesh</td>
<td>50.00</td>
</tr>
<tr>
<td>9</td>
<td>Jammu &amp; Kashmir</td>
<td>250.00</td>
</tr>
<tr>
<td>10</td>
<td>Karnataka</td>
<td>2500.00</td>
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<tr>
<td>11</td>
<td>Kerala</td>
<td>1000.00</td>
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<tr>
<td>12</td>
<td>Madhya Pradesh*</td>
<td>6000.00</td>
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<tr>
<td>13</td>
<td>Maharashtra</td>
<td>4100.00</td>
</tr>
<tr>
<td>14</td>
<td>Manipur</td>
<td>135.00</td>
</tr>
<tr>
<td>15</td>
<td>Meghalaya</td>
<td>20.00</td>
</tr>
<tr>
<td>16</td>
<td>Mizoram</td>
<td>0.00</td>
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<tr>
<td>17</td>
<td>Nagaland</td>
<td>10.00</td>
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<td>18</td>
<td>Orissa</td>
<td>3600.00</td>
</tr>
<tr>
<td>19</td>
<td>Punjab</td>
<td>3000.00</td>
</tr>
<tr>
<td>20</td>
<td>Rajasthan</td>
<td>2750.00</td>
</tr>
<tr>
<td>21</td>
<td>Sikkim</td>
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<td>22</td>
<td>Tamil Nadu</td>
<td>1500.00</td>
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<tr>
<td>23</td>
<td>Tripura</td>
<td>100.00</td>
</tr>
<tr>
<td>24</td>
<td>Uttar Pradesh *</td>
<td>12500.00</td>
</tr>
<tr>
<td>25</td>
<td>West Bengal</td>
<td>2300.00</td>
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<td></td>
<td>Total STATES</td>
<td>58367.00</td>
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<tr>
<td></td>
<td>Total UTs</td>
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</tr>
<tr>
<td></td>
<td>GRAND TOTAL</td>
<td>58465.00</td>
</tr>
</tbody>
</table>

Note: *Figures include the Ultimate Irrigation Potential (UIP) for Jharkhand, Chhatisgarh, Uttaranchal in the UIP of Bihar, Madhya Pradesh and Uttar Pradesh respectively.
### ANNEXURE-III

State-wise details of Net Irrigated Area (NIA), Net Sown Area (NSA) and percentage of NIA to NSA

(In Thousand Hectares)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>States</th>
<th>Net Sown Area (NSA)</th>
<th>Net Irrigated Area (NIA)</th>
<th>% of NIA to NSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Andhra Pradesh</td>
<td>9846.00</td>
<td>3945.00</td>
<td>40.07</td>
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<tr>
<td>2</td>
<td>Arunachal Pradesh</td>
<td>185.00</td>
<td>36.00</td>
<td>19.46</td>
</tr>
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<td>3</td>
<td>Assam</td>
<td>2751.00</td>
<td>572.00</td>
<td>20.79</td>
</tr>
<tr>
<td>4</td>
<td>Bihar</td>
<td>7411.00</td>
<td>3624.00</td>
<td>48.90</td>
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<td>5</td>
<td>Goa</td>
<td>141.00</td>
<td>24.00</td>
<td>17.02</td>
</tr>
<tr>
<td>6</td>
<td>Gujarat</td>
<td>9600.00</td>
<td>3042.00</td>
<td>31.69</td>
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<tr>
<td>7</td>
<td>Haryana</td>
<td>3635.00</td>
<td>2793.00</td>
<td>76.84</td>
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<tr>
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<td>Himachal Pradesh</td>
<td>558.00</td>
<td>105.00</td>
<td>18.82</td>
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<tr>
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<td>Jammu &amp; Kashmir</td>
<td>736.00</td>
<td>309.00</td>
<td>41.98</td>
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<td>10</td>
<td>Karnataka</td>
<td>10075.00</td>
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<td>23.45</td>
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<td>11</td>
<td>Kerala</td>
<td>2271.00</td>
<td>350.00</td>
<td>15.41</td>
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<td>Madhya Pradesh</td>
<td>19940.00</td>
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<td>14.45</td>
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<td>65.00</td>
<td>46.43</td>
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<td>Mizoram</td>
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<td>8.00</td>
<td>7.34</td>
</tr>
<tr>
<td>17</td>
<td>Nagaland</td>
<td>251.00</td>
<td>62.00</td>
<td>24.70</td>
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<td>Rajasthan</td>
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<td>5421.00</td>
<td>31.75</td>
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<td>16.84</td>
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<td>2945.00</td>
<td>52.77</td>
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<td>23</td>
<td>Tripura</td>
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<td>35.00</td>
<td>12.64</td>
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<td>Uttar Pradesh</td>
<td>17513.00</td>
<td>12012.00</td>
<td>68.59</td>
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<tr>
<td>25</td>
<td>West Bengal</td>
<td>5465.00</td>
<td>1911.00</td>
<td>34.97</td>
</tr>
<tr>
<td></td>
<td><strong>Total States</strong></td>
<td><strong>141884.00</strong></td>
<td><strong>54493.00</strong></td>
<td><strong>38.41</strong></td>
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<td></td>
<td><strong>Total UTs</strong></td>
<td><strong>137.00</strong></td>
<td><strong>70.00</strong></td>
<td><strong>51.09</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Grand Total</strong></td>
<td><strong>142021.00</strong></td>
<td><strong>54563.00</strong></td>
<td><strong>38.42</strong></td>
</tr>
</tbody>
</table>

Note: Figures are as per Land Use Statistics brought out by the Ministry of Agriculture for the year 1997-98 and are Provisional.
ANNEXURE -IV

Cost Per Hectare of Creation of Irrigation Potential at Current Prices

(Rupees per hectare)

<table>
<thead>
<tr>
<th>Plan Period</th>
<th>By small Irrigation project</th>
<th>By large/medium irrigation projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Plan (1951-56)</td>
<td>566</td>
<td>1200</td>
</tr>
<tr>
<td>Second Plan (1956-61)</td>
<td>2342</td>
<td>1810</td>
</tr>
<tr>
<td>Third Plan (1961-66)</td>
<td>1960</td>
<td>2526</td>
</tr>
<tr>
<td>Annual Plans (1966-69)</td>
<td>2805</td>
<td>2893</td>
</tr>
<tr>
<td>Fourth Plan (1969-74)</td>
<td>2607</td>
<td>4758</td>
</tr>
<tr>
<td>Fifth Plan (1974-78)</td>
<td>3709</td>
<td>6075</td>
</tr>
<tr>
<td>Annual Plans (1978-80)</td>
<td>3637</td>
<td>10940</td>
</tr>
<tr>
<td>Sixth Plan (1980-85)</td>
<td>4544</td>
<td>21610</td>
</tr>
<tr>
<td>Seventh Plan (1985-90)</td>
<td>6798</td>
<td>50000</td>
</tr>
<tr>
<td>Annual Plans (1990-92)</td>
<td>8102</td>
<td>66570</td>
</tr>
<tr>
<td>Eighth Plan (1992-97)</td>
<td>10051</td>
<td>98495</td>
</tr>
</tbody>
</table>

Source: Planning Commission.
CHAPTER 4

ACCELERATED IRRIGATION BENEFIT PROGRAMME

HIGHLIGHTS

- **Accelerated Irrigation Benefits Programme** was launched by the Government in 1996-97 with the twin objectives - (i) to accelerate ongoing major/medium irrigation projects (ii) to realise bulk benefit from completed projects.

- **Upto the financial year 1999-2000**, Central Loan Assistance (CLA) amounting to Rs.4021.18 crore was released.

- **Since 1999-2000**, surface minor irrigation schemes of special category States of N.E. and hilly States of Jammu & Kashmir(J&K), Himachal Pradesh(H.P.) and Sikkim and both major/medium and minor irrigation schemes of Kalahandi, Bolangir and Koraput (KBK) districts of Orissa covered under the Programme.

- The budget estimate of the AIBP during the financial year 2000-2001 was Rs. 1712.00 crore. Against this, an amount of Rs. 1856.20 crore had been released as the CLA under the AIBP to 105 major/medium and 1629 minor irrigation schemes in various States.

- For the year 2001-2002, a budget provision of Rs. 2000.00 crore has been provided for release of the CLA under the AIBP. Rs. 967.91 crore has already been released for 56 Major/Medium Irrigation projects and Rs. 15.31 crore for 727 surface M.I. Schemes upto November, 2001.

- **20 Major/Medium projects** completed with the help of this programme.

- Under this programme, additional irrigation potential of 1092 thousand hectare (th.ha.) created through major/medium projects up to March, 2001.
ACCELERATED IRRIGATION BENEFIT PROGRAMME

A large number of river valley projects, both multipurpose and irrigation, have spilled over from Plan to Plan mainly on account of financial constraints faced by the State Governments. As a result of this, despite a huge investment having already been made on these projects, the country is not able to derive the planned benefits. There were 171 Major, 259 Medium and 72 ERM ongoing irrigation projects in the country at various stages of construction at the end of the VIIIth Plan (i.e. end of 1996-97) with a spillover cost of Rs.75,690.00 crore. This was a matter of grave concern for the Union Government and remedial measures for expeditious completion of some of the projects, which were in advanced stage of completion, became necessary.

With this end in view, the Government of India launched the Accelerated Irrigation Benefits Programme (AIBP) during 1996-97 for accelerating the implementation of ongoing Irrigation/multi-purpose projects on which substantial progress has been made and which are beyond the resource capability of the State Governments, and for other major and medium Irrigation projects which are in advanced stage of construction and could yield Irrigation benefits in the next four agricultural seasons. Thus the twin objectives of AIBP are (i) to accelerate ongoing irrigation projects (ii) to realize bulk benefits from completed projects.

GUIDELINES OF THE EXISTING PROGRAMME

The present norms being followed are as under :

(i) Projects costing more than Rs. 500.00 crore are included in the programme.

(ii) C.L.A. is released in two advance instalments, the 2nd instalment released on the full utilization of 1st instalment.

(iii) The Projects which are already receiving assistance from domestic agencies, such as National Bank for Agriculture and Rural Development (NABARD), are not considered. However, the components of such projects which are not covered under such assistance are considered for inclusion under the programme.

(iv) CLA is provided to the special category States of N.E. and hilly States of J&K, H.P. and Sikkim in the ratio of 3:1 (Centre:State) and to other States in the ratio of 2:1 (Centre:State).

(v) For funding pattern, drought prone Kalahandi, Bolangir and Koraput (KBK)
districts of Orissa are treated at par with special category States of North-East region, J&K, Himachal Pradesh & Sikkim.

(vi) Major and Medium irrigation projects benefiting KBK districts of Orissa, even if in initial stage of construction, are included under the programme.

(vii) Surface Minor Irrigation Schemes (both new and ongoing) of special category States and KBK districts of Orissa are included under the programme.

(viii) No CLA is provided for establishment cost.

FORM OF ASSISTANCE & MODE OF DISBURSEMENT

Central Loan Assistance under the Programme is given in the form of a loan at the rate of interest prescribed by the Ministry of Finance from time to time (12% at present). The loan under the Programme is repayable in 20 equal instalments together with interest on the outstanding balance commencing from the following year. However, 50% of the loan enjoys 5 years’ initial grace period after which repayment of the loans is affected in 15 equal instalments. The loans actually payable in a year are recovered in 10 equal monthly instalments commencing from June every year. The Central Loan Assistance (CLA) under the AIBP is released on a year-to-year basis for those on-going Irrigation Projects which satisfy the AIBP criteria and are proposed by the States, subject to availability of funds and the budget outlays made by the States for these projects in their respective annual plans.

MONITORING MECHANISM

The projects covered under the AIBP are monitored by the Central Water Commission with the help of its regional offices situated all over the country, and the releases of funds are based upon their reports. The funds are released by the Ministry of Finance on the recommendations of the Ministry of Water Resources.

RELEASES & BENEFITS IN VARIOUS YEARS

During 1996-97, the final budget provision was Rs. 500.00 crores. Rs.500.00 crores were released to 52 projects in 18 States. These projects had the ultimate potential of 8424.24 th. ha. out of which a potential of 80.03 th. ha could be created under the AIBP.

During 1997-98, the final budget provision was Rs. 1100.00 crores. Rs.952.19 crores were released to 73 projects in 18 States having the ultimate potential of 11156.34 th. ha. The potential created under the AIBP during the year was of the order of 217.12 th. ha.

During 1998-99, the final budget provision was Rs. 1200.00 crores. The amount
released during 1998-99 to 78 projects in 14 states having an ultimate potential of 11460.17 th. ha. was Rs. 1119.18 crores. The potential created by these projects during the year 1998-99 was of the order of 282.68 th. ha.

During 1999-2000, the final budget provision was Rs. 1400.00 crores. Rs.1450.48 crores were released to 22 states in respect of 88 major and medium projects having the ultimate potential of 12966.45 th. ha. and 1783 surface minor irrigation schemes having potential of 79.00 th. ha. The potential created during the year 1999-2000 through Major/Medium Schemes was 206.54 th. ha.

The budget estimate of the AIBP during the financial year 2000-01 was Rs.1712.00 crores. Against this, an amount of Rs.1856.20 crore had been released as the CLA under the AIBP to 105 major/medium and 1629 (591 new & 1038 on-going) minor irrigation schemes in various States. The Potential Created during the year 2000-01 through Major/Medium Schemes was 310.60 th. ha.

**CLA RELEASES DURING THE CURRENT YEAR**

For the year 2001-2002, a budget provision of Rs. 2000.00 crores has been provided for release of the CLA under the AIBP. Rs. 967.91 crores has already been released for 56 Major/Medium Irrigation projects and Rs. 15.31 crores for 727 surface Minor Irrigation Schemes upto November, 2001 during the current financial year 2001-2002. The State-wise details of CLA released under AIBP and CLA are given at ANNEXURE-II.

**OVERALL CUMULATIVE RELEASE & BENEFITS**

It may be seen that by providing an amount of about Rs. 6861.28 crores (Rs. 6722.96 crores for 146 Major/Medium projects in 23 States and Rs. 138.32 crores for 2374 surface M.I. Schemes in 10 special category states) since the inception of the programme in 1996-97, the Government has been able to expedite the creation of additional irrigation potential to the tune of 1092.00 th. ha. upto March, 2001 through major/medium schemes. 20 Major/Medium Projects have since been completed with the help of this programme. The ultimate irrigation potential of the projects covered under the AIBP is about 13773.00 th. ha., out of which about 5346.00 th. ha. had been created before these projects were covered under the AIBP. Since 1092.00 th. ha. has already been created upto March, 2001, therefore to cover the balance 7335.00 th. ha. beyond March, 2001 an amount of about Rs. 38,970.00 crores would be required.
### Statewise Details Of CLA Released Under AIBP During 2000-2001

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the State</th>
<th>No. of projects</th>
<th>Amount of CLA released (Rs. in Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Major/ Medium</td>
<td>Minor</td>
</tr>
<tr>
<td>1.</td>
<td>Andhra Pradesh</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>Arunachal Pradesh</td>
<td>-</td>
<td>532</td>
</tr>
<tr>
<td>3.</td>
<td>Assam</td>
<td>6</td>
<td>46</td>
</tr>
<tr>
<td>4.</td>
<td>Bihar</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>5.</td>
<td>Chhattisgarh *</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>6.</td>
<td>Goa</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>7.</td>
<td>Gujarat</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>8.</td>
<td>Himachal Pradesh</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>9.</td>
<td>J &amp; K</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>10.</td>
<td>Jharkhand *</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>11.</td>
<td>Karnataka</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>12.</td>
<td>Kerala</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>13.</td>
<td>Madhya Pradesh</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>14.</td>
<td>Maharashtra</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>15.</td>
<td>Manipur</td>
<td>0</td>
<td>108</td>
</tr>
<tr>
<td>16.</td>
<td>Meghalaya</td>
<td>1</td>
<td>47</td>
</tr>
<tr>
<td>17.</td>
<td>Mizoram</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>18.</td>
<td>Nagaland</td>
<td>0</td>
<td>468</td>
</tr>
<tr>
<td>19.</td>
<td>Orissa</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>20.</td>
<td>Punjab</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>21.</td>
<td>Rajasthan</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>22.</td>
<td>Tripura</td>
<td>3</td>
<td>335</td>
</tr>
<tr>
<td>23.</td>
<td>Uttar Pradesh</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>23.</td>
<td>West Bengal</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td></td>
<td>105</td>
<td>1629</td>
</tr>
</tbody>
</table>

* Before November, 2000 CLA for projects in Jharkhand and Chhattisgarh released to Bihar and Madhya Pradesh respectively.
### ANNEXURE –II

**State-wise Details of CLA Released Under AIBP During 2001-2002**

(Rs. in crore)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the State</th>
<th>No. of Projects</th>
<th>Amount of CLA Released</th>
<th>Total CLA Ceiling by Plg. Comm.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No. Released</td>
<td>Major/ Medium</td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Andhra Pradesh</td>
<td>4</td>
<td>75.99</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>Arunachal Pradesh</td>
<td>0</td>
<td>0.00</td>
<td>7.56</td>
</tr>
<tr>
<td>3</td>
<td>Assam</td>
<td>5</td>
<td>9.08</td>
<td>0.00</td>
</tr>
<tr>
<td>4</td>
<td>Bihar</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>5</td>
<td>Chhattisgarh</td>
<td>3</td>
<td>16.60</td>
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<td>Goa</td>
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<td>7</td>
<td>Gujarat</td>
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<td>202.58</td>
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<td>8</td>
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<td>0.00</td>
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<td>9</td>
<td>Himachal Pradesh</td>
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<td>3.24</td>
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<tr>
<td>10</td>
<td>Jammu &amp; Kashmir</td>
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<td>0.00</td>
<td>0.00</td>
</tr>
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<td>11</td>
<td>Jharkhand</td>
<td>3</td>
<td>10.82</td>
<td>0.00</td>
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<td>12</td>
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<td>6</td>
<td>255.94</td>
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</tr>
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<td>13</td>
<td>Kerala</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
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<td>14</td>
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<td>68.32</td>
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<td>15</td>
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<td>17.85</td>
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<td>State</td>
<td>Deaths</td>
<td>Int.</td>
<td>Total</td>
<td>Plant</td>
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<tr>
<td>---------------</td>
<td>--------</td>
<td>------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
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<td>1.22</td>
<td>0.00</td>
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<td>Mizoram</td>
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<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
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<td>Nagaland</td>
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<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Orissa</td>
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<td>0</td>
<td>1.42</td>
<td>0.00</td>
</tr>
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<td>Punjab</td>
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<td>63.69</td>
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</tr>
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<td>Uttaranchal (Tentative)</td>
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<td>0.00</td>
</tr>
<tr>
<td>West Bengal (Tentative)</td>
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<tr>
<td>Sikkim</td>
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<td>76</td>
<td>0.00</td>
<td>0.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>56</td>
<td>727</td>
<td>967.91</td>
<td>15.31</td>
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## ANNEXURE-III

**Central Loan Assistance (Cumulative State-wise) Released Under AIBP From 1996-97 To 2001-2002**

(Rs. in crores)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>State</th>
<th>Total CLA Released (upto November, 2001)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Andhra Pradesh</td>
<td>424.95</td>
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<td>2</td>
<td>Arunachal Pradesh</td>
<td>22.56</td>
</tr>
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<td>3</td>
<td>Assam</td>
<td>79.28</td>
</tr>
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<td>4</td>
<td>Bihar</td>
<td>332.97</td>
</tr>
<tr>
<td>5</td>
<td>Chhattisgarh</td>
<td>55.05</td>
</tr>
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<td>6</td>
<td>Goa</td>
<td>92.90</td>
</tr>
<tr>
<td>7</td>
<td>Gujarat</td>
<td>1592.62</td>
</tr>
<tr>
<td>8</td>
<td>Haryana</td>
<td>44.50</td>
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<td>9</td>
<td>Himachal Pradesh</td>
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<td>Jammu &amp; Kashmir</td>
<td>16.44</td>
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<td>Jharkhand</td>
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<td>Karnataka</td>
<td>830.33</td>
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<td>Kerala</td>
<td>41.15</td>
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<td>14</td>
<td>Madhya Pradesh</td>
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<td>15</td>
<td>Maharashtra</td>
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<td>16</td>
<td>Manipur</td>
<td>71.25</td>
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<td>17</td>
<td>Meghalaya</td>
<td>9.42</td>
</tr>
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<td>18</td>
<td>Mizoram</td>
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<td>19</td>
<td>Nagaland</td>
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</tr>
<tr>
<td>20</td>
<td>Orissa</td>
<td>396.94</td>
</tr>
<tr>
<td>21</td>
<td>Punjab</td>
<td>328.81</td>
</tr>
<tr>
<td>22</td>
<td>Rajasthan</td>
<td>423.49</td>
</tr>
<tr>
<td>23</td>
<td>Tripura</td>
<td>70.50</td>
</tr>
<tr>
<td>24</td>
<td>Tamilnadu</td>
<td>20.00</td>
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<tr>
<td>25</td>
<td>Uttar Pradesh</td>
<td>932.47</td>
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<tr>
<td>26</td>
<td>Uttaranchal</td>
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<td>27</td>
<td>West Bengal</td>
<td>110.53</td>
</tr>
<tr>
<td>28</td>
<td>Sikkim</td>
<td>1.86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6861.27</strong></td>
</tr>
</tbody>
</table>
## ANNEXURE-IV

**Major / Medium Projects which have been Completed**

<table>
<thead>
<tr>
<th>SL.No.</th>
<th>Name of State/ Project</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Assam</strong></td>
</tr>
<tr>
<td>1.</td>
<td>Rupahi</td>
</tr>
<tr>
<td></td>
<td><strong>Bihar</strong></td>
</tr>
<tr>
<td>2.</td>
<td>Bilasi Reservoir</td>
</tr>
<tr>
<td></td>
<td><strong>Jharkhand</strong></td>
</tr>
<tr>
<td>3.</td>
<td>Tapkara Reservoir</td>
</tr>
<tr>
<td>4.</td>
<td>Lattratu</td>
</tr>
<tr>
<td>5.</td>
<td>Kansjore</td>
</tr>
<tr>
<td></td>
<td><strong>Gujarat</strong></td>
</tr>
<tr>
<td>6.</td>
<td>Jhuj</td>
</tr>
<tr>
<td>7.</td>
<td>Sipu</td>
</tr>
<tr>
<td>8.</td>
<td>Damanganga</td>
</tr>
<tr>
<td>9.</td>
<td>Karjan</td>
</tr>
<tr>
<td>10.</td>
<td>Sukhi</td>
</tr>
<tr>
<td>11.</td>
<td>Deo</td>
</tr>
<tr>
<td>12.</td>
<td>Watrak</td>
</tr>
<tr>
<td>13.</td>
<td>Harnav-II</td>
</tr>
<tr>
<td>14.</td>
<td>Umaria</td>
</tr>
<tr>
<td></td>
<td><strong>Rajasthan</strong></td>
</tr>
<tr>
<td>15.</td>
<td>Jaismand</td>
</tr>
<tr>
<td>16.</td>
<td>Gambhiri</td>
</tr>
<tr>
<td></td>
<td><strong>Punjab</strong></td>
</tr>
<tr>
<td>17.</td>
<td>Ranjit Sagar Dam</td>
</tr>
<tr>
<td></td>
<td><strong>Uttar Pradesh</strong></td>
</tr>
<tr>
<td>18.</td>
<td>Rajghat Dam</td>
</tr>
<tr>
<td>19.</td>
<td>Gunta Nala Dam</td>
</tr>
<tr>
<td>20.</td>
<td>Sarda Sahayak</td>
</tr>
</tbody>
</table>
CHAPTER 5
COMMAND AREA DEVELOPMENT PROGRAMME

HIGHLIGHTS

● Command Area Development (CAD) Programme now covers 234 projects with a CCA of 22.78 m.ha. in 28 States and 2 UTs.

● Since its inception in 1974-75, an amount of Rs. 2377.50 crores released to the States under this Programme upto February, 2002.

● Of the outlay of Rs.115.53 crores in the current year budget, Rs.91.83 crores released to States upto February, 2002.

● 48 National level and 7 States level training courses for senior level officers and farmers sanctioned during the year upto February, 2002.

● The Ministry of Water Resources has given a thrust to the participation of farmers in the management of irrigation by forming Water Users’ Associations. 39,000 Water Users’ Associations have been formed in various States covering an area of 77.00 Lakh Hectare.
The Government of India launched a Centrally Sponsored Scheme of Command Area Development (CAD) Programme in 1974-75. The primary objective of the CAD Programme has been to bridge the gap between the irrigation potential created and that utilized, through increase in irrigated areas and thereon, to increase efficient utilization of irrigation water and improve agricultural productivity in the irrigation commands. The programme envisaged an integrated and co-ordinated approach to the development and management of command areas by constituting a multi-disciplinary team under the overall control of the Command Area Development Authorities.

COMPONENTS OF THE PROGRAMME

1. On-Farm Development (OFD) works i.e. development of field channels and field drains within the command of each outlet; land leveling on an outlet command basis; reclamation of waterlogged areas; enforcement of a proper system of "Warabandi" (rotational water supply) and fair distribution of water to individual fields; realignment of field boundaries, wherever necessary (where possible, consolidation of holding are also combined); supply of all inputs and services - including credit; strengthening of extension services; and, encouraging farmers for Participatory Irrigation Management (PIM).

2. Selection and introduction of suitable cropping patterns.

3. Development of ground water to supplement surface irrigation (conjunctive use under Minor Irrigation sector).

4. Development and maintenance of the main and intermediate drainage system (irrigation sector).

5. Modernisation, maintenance and efficient operation of the irrigation system upto the outlet of one cusec capacity (irrigation sector).

PROGRAMME COVERAGE

Beginning with 60 Major and Medium Irrigation Projects in 1974-75, the Programme now covers 234 projects with a culturable command area of 22.78 million hectares spread over 28 States and 2 Union Territories.

PROGRAMME IMPLEMENTATION

The Command Area Development Wing of the Ministry of Water Resources coordinates and monitors the implementation of the Command Area Development Programme at
the national level. Proposals received from the States for inclusion of new projects under the Programme are examined and, if found techno-economically feasible, are included under the Programme. Progress is measured through physical and financial progress reports of the programme as received from the States. The quality of works is ensured through monitoring, including field visits. Moreover, technical guidelines and manuals have been circulated to the States in this regard. Functionaries are trained on specific subjects from time to time, besides holding various meetings, workshops, seminars on different technical and managerial aspects.

The programme is being implemented by the State Governments through Command Area Development Authorities (CADAs) set up by them. However, in some States, namely Arunachal Pradesh, Himachal Pradesh, Meghalaya, Nagaland, Tamil Nadu and Tripura, CAD Authorities have not been constituted and the Programme is being administered through the concerned line (Agriculture/ Irrigation) Departments.

FINANCING PATTERN

The financing of the activities carried out under the Programme comes from the following three sources viz; State outlays; Central assistance on matching basis for certain identified activities; and Institutional finance.

The financing pattern for providing Central Assistance to the States keeps on changing from Plan to Plan as per the past experience. The financing pattern in force from April, 1996 is, however, as follows :-

(1) Grants will be admissible on matching basis to the State Governments for establishment, topographical and soil surveys, planning and design of OFD works, supervision of OFD works, construction of field channels and field drains, enforcement of Warabandi, adaptive trials, demonstration and training, crop compensation, subsidy to small and marginal farmers on identified items, evaluation studies sponsored by the States, reclamation of waterlogged areas and one-time functional grants to the Water Users’ Associations.

(2) Hundred percent grant from the Central Government is given for orientation training for senior level officers and also for evaluation studies, sponsored by the Central Government.

(3) Subsidy is admissible for land levelling and shaping, ground water development and sprinkler and drip irrigation to small and marginal farmers, on the pattern followed under the Integrated Rural Development Programme (IRDP).

(4) Loan for the purchase of equipment and machinery is provided to the States on a matching basis.

FINANCIAL ACHIEVEMENTS

An amount of Rs.2377.50 crores has been released to States as Central Assistance under
the CAD Programme upto February, 2002 since its inception. During the year 2000-2001, an amount of Rs.144.95 crores was spent. An outlay of Rs.187.19 crores has been provided under the Central Sector for implementation of the Programme during 2001-2002 of which an amount of Rs. 91.83 crores has been released to the States till February, 2002. The revised estimates for the programme for the year 2001-2002 is Rs.115.53 crores.

PHYSICAL ACHIEVEMENTS

The core components of physical works are construction of field channels and field drains, implementation of warabandi (rotational water supply) and land levelling and shaping. Cumulative achievements in respect of these components upto March, 2001 since inception are given below :

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item of work</th>
<th>Cumulative achievement till March, 2001</th>
<th>Target</th>
<th>Anticipated Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Field channels</td>
<td>153.42</td>
<td>2.35</td>
<td>2.35</td>
</tr>
<tr>
<td>2.</td>
<td>Field drains</td>
<td>10.46</td>
<td>0.35</td>
<td>0.35</td>
</tr>
<tr>
<td>3.</td>
<td>Warabandi</td>
<td>99.18</td>
<td>6.00</td>
<td>6.00</td>
</tr>
<tr>
<td>4.</td>
<td>Land levelling and shaping</td>
<td>21.72</td>
<td>0.22</td>
<td>0.22</td>
</tr>
</tbody>
</table>

PARTICIPATORY IRRIGATION MANAGEMENT (PIM)

The National Water Policy 1987 advocated involvement of farmers in the management of irrigation. The irrigation potential increased nearly four times since the beginning of the planned era but brought in several problems of management of irrigation in its wake. These included unreliable and inequitable supply of water, especially at the tail-end of distributaries, improper operation and maintenance of the systems, poor recovery of water rates, indiscipline in the distribution of water and the problem of waterlogging due to seepage from canal network on the one hand and over irrigation on the other. To address these problems it has been recognized that participation of beneficiaries will help greatly towards the optimal upkeep of irrigation system and utilization of irrigation water. Keeping this in view, PIM is a thrust area under the Programme during the Ninth Five Year Plan period.

The participation of farmers in the management of irrigation would give responsibility for operation and maintenance and collection of water rates from the areas
under the jurisdiction of the Water Users’ Associations of concerned hydraulic level. Under the CAD Programme, presently a provision exists for a one-time functional grant to farmers’ Associations @ Rs. 500.00 per hectare - of which, Rs. 225.00 per hectare is provided by the Central Government and the State Governments each, and Rs. 50.00 per hectare is to be contributed by the Farmers’ Association.

The Governments of Andhra Pradesh, Goa, Karnataka, Tamil Nadu, Rajasthan and Madhya Pradesh have enacted/amended legislations for the establishment of the Water Users’ Associations. Other States are also in the process of taking steps in this direction. About 39,000 Water Users’ Associations have been formed in various States, covering an area of about 77.00 lakh hectares under different irrigation projects.

RECLAMATION OF WATER LOGGED AREAS

Water logging, soil salinity and alkalinity are mainly caused by unscientific management of soil, water and crops in the irrigation projects. Obstruction of natural drainage, improper upkeep of irrigation network and sluggish drainage are some of the other causes. To tackle this problem, a new component “Reclamation of Waterlogged Areas in Irrigation Commands” has been included under the CAD Programme since 01.04.1996, under which 50 per cent of the cost of reclamation or Rs. 6,000.00 per hectare is admissible as Central assistance to the State Governments in the form of grant.

Four Hundred forty one proposals on an estimated cost of Rs. 44.45 crores, covering an area of 57,123 hectares for reclamation of water logged areas in the irrigation commands in eight States namely, Bihar, Gujarat, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Uttar Pradesh have been approved and are currently under various stages of implementation by the State Governments.

Training Programmes

Orientation training programmes meant for the senior level officers are fully funded by the Central Government, while the cost of training other functionaries and farmers is shared equally by the Centre and the State Governments. The training programmes are either being organised through Water and Power Consultancy Services (India) Ltd., National Water Academy, Pune, Water and Land Management Institutes (WALMIS), Administrative Staff College of India (ASCI, Hyderabad), Central Soil Salinity Research Institute (CSSRI, Karnal) or other such institutions. During this year (upto February, 2002), forty eight National Level and Seven State Level Training programmes have been sanctioned by the Ministry on different aspects of the CAD Programme.

Award Scheme for Water Users’ Association (WUAs) for Participatory Irrigation Management (PIM)

The Ministry of Water Resources has been playing a promotional role by encouraging
the implementation of PIM in the country through incentives in various forms like technical advice, financial assistance, providing training/ study tour etc. During the last National Conference on Participatory Irrigation Management held at Hyderabad during January 19-23, 1999, one such financial incentive, in the form of awards to Water Users’ Association (WUAs), was announced by the Secretary, Ministry of Water Resources. In conformity with this announcement, the Ministry has called for proposals to introduce the Award Scheme. The Scheme will include three prizes, first, second and third amounting to Rs. 50,000/-, Rs. 30,000/- and Rs. 20,000/- respectively. In addition to this, there will be 10 consolation prizes of Rs. 10,000/- each. The selection of awardees will be made through a committee, based on the performance of the Water Users’ Associations during last three years.
**HIGHLIGHTS**

- Presently, there are 19 ongoing externally aided projects in the water resources sector.
- Three externally aided projects were completed during the year.
- Fourteen projects are under consideration for external assistance from World Bank, Japan, Germany and France.
- During the financial year 2000-2001, external assistance amounting to Rs. 863.80 crores has been received from World Bank, the European Economic Community and other bilateral agencies and utilized by the Central and State Governments.
The Ministry of Water Resources and its organizations assist the State Governments in tying up external assistance from different funding agencies to fill up the resources gaps both in terms of funds and technological update for rapid development of country’s water resources. The World Bank continues to be the primary source of external assistance in the water resources sector. Assistance is also available from European Economic Community and other country sources like the Japanese Bank for International Cooperation (JBIC)-Japan, Kreditanstalt fur Wiederausban (KfW)-Germany, Netherlands etc. on a bilateral basis.

A brief account of 19 on-going externally aided projects with external assistance from the World Bank, European Economic Community (EEC) and other bilateral agencies/countries like the Netherlands, France, Germany and OECF, Japan in various States is as follows:-

### A. MULTILATERAL ASSISTANCE

#### (I) WORLD BANK SUPPORTED PROJECTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Project</th>
<th>State</th>
<th>Amount of Assistance (US$ in Million)</th>
<th>Type of Assistance</th>
<th>Utilisation of assistance Upto 31.12.2001 (US$ in Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Haryana Water Resource Consolidation Project</td>
<td>Haryana</td>
<td>258.00</td>
<td>Credit</td>
<td>234.99</td>
</tr>
<tr>
<td>2.</td>
<td>T.N.Water Resources Consolidation project</td>
<td>Tamil Nadu</td>
<td>282.90</td>
<td>Credit</td>
<td>134.85</td>
</tr>
<tr>
<td>3.</td>
<td>Orissa Water Resources Consolidation project</td>
<td>Orissa</td>
<td>290.90</td>
<td>Credit</td>
<td>175.74</td>
</tr>
<tr>
<td>4.</td>
<td>Hydrology Project</td>
<td>Multi-State</td>
<td>142.00</td>
<td>Credit</td>
<td>63.21</td>
</tr>
<tr>
<td>5.</td>
<td>Andhra Pradesh III Irrigation project</td>
<td>Andhra Pradesh</td>
<td>325.00</td>
<td>Credit/Loan</td>
<td>122.44</td>
</tr>
<tr>
<td>6.</td>
<td>Andhra Pradesh Economic Restructuring Project</td>
<td>Andhra Pradesh</td>
<td>142.00</td>
<td>Credit/Loan</td>
<td>62.99*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>1440.80</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### (II) ASSISTANCE FROM EUROPEAN ECONOMIC COMMUNITY

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Project</th>
<th>State</th>
<th>Amount of Assistance (ECU+ in Million)</th>
<th>Type of Assistance</th>
<th>Utilisation of Assistance upto 31.12.2001 (ECU in Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Sidhmukh &amp; Nohar Project</td>
<td>Rajasthan</td>
<td>45.00</td>
<td>Grant</td>
<td>43.10</td>
</tr>
<tr>
<td>8</td>
<td>Minor Irrigation Project</td>
<td>Orissa</td>
<td>10.70</td>
<td>Grant</td>
<td>1.11</td>
</tr>
<tr>
<td>9</td>
<td>Tank Rehabilitation Project</td>
<td>Pondicherry</td>
<td>6.65</td>
<td>Grant</td>
<td>0.00</td>
</tr>
<tr>
<td>10</td>
<td>Maharashtra Saline Land Reclamation Project</td>
<td>Maharashtra</td>
<td>15.50</td>
<td>Grant</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>77.85</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* European Community Unit (ECU)

### (B) BILATERAL ASSISTANCE

#### (i) JAPAN

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Project</th>
<th>State</th>
<th>Amount of Assistance (in Million)</th>
<th>Type of Assistance</th>
<th>Utilization of Assistance upto 31.12.2001 (in Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Modernisation of Kurnool-Cuddapah Canal</td>
<td>Andhra Pradesh</td>
<td>Yen 16049</td>
<td>Loan</td>
<td>Yen 4522.31</td>
</tr>
<tr>
<td>12</td>
<td>Rajghat Canal Major Irrigation Project</td>
<td>Madhya Pradesh</td>
<td>Yen 13222</td>
<td>Loan</td>
<td>Yen 3963.72</td>
</tr>
<tr>
<td>13</td>
<td>Rengali irrigation Project</td>
<td>Orissa</td>
<td>Yen 7760</td>
<td>Loan</td>
<td>Yen 3334.91</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>Yen 37031</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### NETHERLANDS

<table>
<thead>
<tr>
<th>S. No.</th>
<th>State/Project Description</th>
<th>State</th>
<th>Amount of Assistance</th>
<th>Utilisation of Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Andhra Pradesh Ground Water Project (APWELL)</td>
<td>Andhra Pradesh</td>
<td>Dfl 26.84 Grant</td>
<td>Dfl 12.28</td>
</tr>
<tr>
<td>15</td>
<td>Community Irrigation Project</td>
<td>Kerala</td>
<td>Dfl 2.32 Grant</td>
<td>Dfl 2.14</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>Dfl 29.16</strong></td>
<td></td>
</tr>
</tbody>
</table>

### FRANCE

<table>
<thead>
<tr>
<th>S. No.</th>
<th>State/Project Description</th>
<th>State</th>
<th>Amount of Assistance</th>
<th>Utilisation of Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Hydroplus Fusegates System on Eight Ungated Schemes</td>
<td>Gujarat</td>
<td>FF 34.74 Loan/Credit</td>
<td>FF 33.99</td>
</tr>
<tr>
<td>17</td>
<td>Ground Water Exploration Project in North West of Imphal</td>
<td>Manipur</td>
<td>FF 4.62 Loan/Credit</td>
<td>FF 4.62</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>FF 39.36</strong></td>
<td></td>
</tr>
</tbody>
</table>

### GERMANY

<table>
<thead>
<tr>
<th>S. No.</th>
<th>State/Project Description</th>
<th>State</th>
<th>Amount of Assistance</th>
<th>Utilisation of Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Maharashtra Minor Irrigation Project</td>
<td>Maharashtra</td>
<td>DM 45.00 Loan</td>
<td>0.99</td>
</tr>
<tr>
<td>19</td>
<td>Lift Irrigation Project</td>
<td>Orissa</td>
<td>DM 55.00 Loan</td>
<td>DM 40.59</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>DM 100.00</strong></td>
<td></td>
</tr>
</tbody>
</table>

### PROJECTS COMPLETED DURING THE YEAR 2001-2002

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Project &amp; State</th>
<th>Name of funding agency</th>
<th>Amount of assistance</th>
<th>Utilisation of assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.**</td>
<td>Rajasthan Agriculture &amp; Drainage Research Project (RAJAD)</td>
<td>Rajasthan</td>
<td>CIDA</td>
<td>#CD 14.99 CD 9.41</td>
</tr>
</tbody>
</table>
2.*** Minor Irrigation Project Kerala EEC ECU 11.80 ECU 3.71
3. Bundelkhand U.P. Netherlands Dfl 2.79 Dfl. 1.35

| Integrated Water Resources Management Project |

# CD = Canadian Dollar

* Only Irrigation Component.

** The Project was completed during the year 2000-2001.

*** Govt. of Kerala through Ministry of Water Resources and Department of Economic Affairs has requested for the extension of the Project upto 31.12.2001, but this has not been agreed to by the European Economic Community in September, 2001.

### PROJECTS UNDER CONSIDERATION

The following projects are under consideration for Assistance with various agencies:-

#### (A) WORLD BANK

1. Rajasthan Water Sector Restructuring Project, Rajasthan
   - Negotiations held on from 1-5 November, 2001

2. Uttar Pradesh Water Sector Restructuring Project, U.P.
   - Negotiations held on from 5-8 November, 2001

3. Gujarat Water Resources Consolidation Project, Gujarat

4. Gujarat Salinity Prevention Project, Gujarat

5. Karnataka Tank Improvement Project, Karnataka
   - Project under approval

6. Dam Safety Project Phase-II, Multistate

7. Tripura Irrigation & Rural Management Works

#### (B) BILATERAL ASSISTANCE

(i) JAPAN

8. Rehabilitation of Minor Irrigation Tanks for Rural development, Tamilnadu

(ii) GERMAN

9. Minor Irrigation Project, Himachal Pradesh

10. Minor Irrigation Project (Phase II), Rajasthan
During the financial year 2000-2001 an amount of Rs. 863.80 Crore and the current financial year 2001-2002 (upto December 2001), an amount of Rs. 606.40 Crore has been received from the World Bank, EEC and other Bilateral agencies and utilized by the State Governments and Government of India for implementation of various externally aided Projects in the Water Resources Sector.

HYDROLOGY PROJECT (HP)

The Government of India has launched the Hydrology Project (HP) with World Bank (IDA) credit assistance of 90.10 million Special Drawing Rights (US$ 142.00 million equivalent). Besides, under the bilateral Indo-Dutch agreement, the Government of Netherlands is providing grant-in-aid assistance of 29.90 million Dutch guilders (US$ 17.40 million) in the form of Technical Assistance as consultancy services and overseas training to all participating states and Central agencies. The Project is being implemented in nine states viz; Andhra Pradesh, Chattisgarh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamilnadu and five Central agencies viz; Central Water Commission (CWC), Central Ground Water Board (CGWB), Central Water and Power Research Station (CWPRS), National Institute of Hydrology (NIH) and India Meteorological Department (IMD).

The project implementation commenced from September, 1995 and will end on March 2003. As per the revised proposal, the total cost of the project has been estimated at 600.08 crores with the central and state component as Rs.186.31 crores and Rs.413.77 crores respectively. The total revised baseline cost of the project has been estimated to be Rs.566.55 crores. The project is being implemented by five Central agencies namely the Central Water Commission, Central Ground Water Board, National Institute of Hydrology, Central and Power Research Station and India Meteorological Department; and nine states viz: Andhra Pradesh, Karnataka, Kerela, Gujarat, Maharashtra, Madhya Pradesh Chattisgarh, Orissa and Tamil Nadu. The main Objective of the HP is to improve the institutional and organizational arrangements, technical capabilities and physical facilities available for measurement, validation, collection,
Project Objectives and Scope

The main objective of the HP is to improve the institutional and organisational arrangements, technical capabilities and physical facilities available for measurement, validation, collection, analysis, transfer and dissemination of hydrological, hydrometeorological and water quality data for water resource evaluation and planning & management within the concerned agencies at Central Government level and in the participating states. The Project would upgrade and expand the physical infrastructure through construction of observation site works and buildings, and provisions of measuring instrumentation and equipment, and laboratory facilities. The Project would introduce novel equipments like Automatic Water Level Recorders, Acoustic Doppler Current Profilers for Surface and Groundwater Observation Systems and Atomic Absorption Spectro-Photometer, Gas Chromatograph, UV Spectrometer for Surface and Ground water quality monitoring.

The Project would help in the development of interactive computerised data banks within CWC’s and CGWB’s Regional Offices and the State agencies responsible for surfacewater and groundwater hydrological data collection. These data banks are proposed to be interactive hierarchically and laterally through ISDN/dial up mode of connectivity through internet. Separate National Data Centers will be established at CWC and CGWB headquarters for Surfacewater and Groundwater respectively with ISDN/dial up mode facilities. The State Data Centers as well as CWC and CGWB regional data banks will have interactive data bases with the National Data Center. The above arrangement would help to develop comprehensive, easily accessed and user friendly data bases covering all aspects of the hydrological cycle including surface water and groundwater in terms of quality and climatic measurements. State of the art computer hardware and software and communication systems would be provided under the project for this purpose.

The project would introduce standard procedures for data collection, processing, validation and management, including the use of software for routine quality control and general water resources analysis. This necessitates development of qualified staff for all hydrological activities with wide understanding of hydrological data evaluation. The training program envisaged under the project will ensure that these standardised procedures are followed uniformly throughout the project area, and the staff capabilities developed during the project
Coordination and Monitoring Arrangements

Considering the number of agencies involved in project implementation, extensive coordination and monitoring arrangements have been put in place both at the Central and State levels. At the Central level, a National Level Steering Committee (NLSC) has been set up under the Chairmanship of Secretary (Water Resources) with representation at Secretary level of all participating state governments and the central agencies. The NLSC resolves project policy and strategy and generic implementation issues. Under the NLSC, a National Coordination Committee (NCC) has been set up under the Chairmanship of Member (RM), Central Water Commission. The NCC deals with matters relating to overall project coordination and acts in an advisory capacity to the project coordinating groups at state level. In addition, a Project Coordination Secretariat (PCS) has been set up in the WM Wing of Ministry of Water Resources to provide secretarial assistance to the NLSC and NCC and to undertake day-to-day administration and management of project implementation. The World Bank also monitors the project implementation through its supervision missions at regular intervals. The HP consultants are also assisting in the project implementation. Coordination and monitoring arrangements have also been set-up in the States.

Project Benefits

The Project on completion is envisaged to generate substantial benefits by improving the water resources and climate data base of the participating agencies, and making data easily available to legitimate users from computerised data banks. Reliable water data, with adequate coverage in content, time and space is the foundation on which all water resource planning, development and management exercises are based. The improved hydrological and hydrometeorological information would help in making reliable and efficient – a) investment decisions in which water resources availability is a dominant determinate (i.e. irrigated agriculture, water supply and sanitation, industrial water use, etc.); and b) operational decisions in existing enterprises in which water is an essential input to achieve predicted impact.

Project Implementation Progress

The six year project is designed to complete all infrastructural facilities for observation stations, laboratories and data centers during the first half of the project and to improve data collection, storage, transfer and usage facilities during the second phase. The project progress realised so far is satisfactory. The total cumulative expenditure incurred under the project up to August 31, 2001 is Rs.376.85 crores which is 66.5% of the revised project baseline cost.
The major reasons that held up the project in the initial years are: a) delay in project commencement – the actual project implementation commenced from April, 1996 instead of September, 1995 because of delay in administrative clearances, b) difficulty on the part of implementing agencies in getting accustomed to World Bank procurement procedures, c) certain policies of the State/ Central Government e.g. ban on creation of new posts and procurement of new vehicles, d) lack of experience in the country over the usage of hi-tech equipments, provided for procurement in the project, and e) delay in transfer of Government land for buildings etc.

Most of the above issues have been resolved and the project is now firmly on rails. The physical progress upto August 31, 2001 of the components of the project is as below:-

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component</th>
<th>Financial progress as on 31.08.2001 in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Civil works</td>
<td>77</td>
</tr>
<tr>
<td>2</td>
<td>Equipment and material (goods)</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>Training and studies</td>
<td>59</td>
</tr>
<tr>
<td>4</td>
<td>Incremental staff salaries and recurrent costs</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL AVERAGE</strong></td>
<td><strong>66.5</strong></td>
</tr>
</tbody>
</table>

The component-wise financial progress is as under:-

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Component</th>
<th>Target</th>
<th>Achieved</th>
<th>% achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>River gauging sites</td>
<td>916</td>
<td>854</td>
<td>93</td>
</tr>
<tr>
<td>2</td>
<td>Meteorological stations</td>
<td>450</td>
<td>434</td>
<td>96</td>
</tr>
<tr>
<td>3</td>
<td>Observation wells</td>
<td>7912</td>
<td>5898</td>
<td>75</td>
</tr>
<tr>
<td>4</td>
<td>Water quality</td>
<td>274</td>
<td>240</td>
<td>88</td>
</tr>
<tr>
<td>5</td>
<td>Buildings</td>
<td>1586</td>
<td>1409</td>
<td>89</td>
</tr>
<tr>
<td>6</td>
<td>Computer</td>
<td>668</td>
<td>391</td>
<td>59</td>
</tr>
<tr>
<td>7</td>
<td>Vehicles</td>
<td>578</td>
<td>500</td>
<td>87</td>
</tr>
<tr>
<td>8</td>
<td>Training</td>
<td>23663</td>
<td>19378</td>
<td>82</td>
</tr>
<tr>
<td>9</td>
<td>Incremental staffing</td>
<td>3172</td>
<td>2208</td>
<td>70</td>
</tr>
</tbody>
</table>
With the present state of preparedness and actions already taken on procurement, it is hoped that the envisaged physical infrastructure would be in place within the project duration. Presently five project components have been identified as being on the critical path, which are: (i) establishment of Surface Water (SW) data processing centers; (ii) establishment of Ground Water (GW) data processing centers; (iii) establishment of data storage centres; (iv) data dissemination and interaction with data users; and (v) operationalization of Water Quality (WQ) laboratories. Though these project components will be substantially completed in terms of investments towards the project, the time to obtain adequate experience on the operation of these components will be inadequate, which could affect the project sustainability.

WATER RESOURCES CONSOLIDATION PROJECTS (WRCP)

The Water Resources Consolidation Projects (WRCPs) are the new generation irrigation projects assisted by the World Bank. The WRCPs deal with the irrigation sector in its entirety and State as a whole to realise the basic objective postulated in the National Water Policy. The World Bank has extended credit assistance on a larger scale under separate Water Resources Consolidation Project (WRCP) individually to three States namely Haryana, Orissa and Tamil Nadu, who were the main participants of NWMP-I. The main objectives of WRCP are: improving institutional and technical capability of managing the State’s water resources, planning of water resources river basinwise across all uses of water, improving agricultural productivity through rehabilitation and completion of irrigation schemes and farmers’ participation, assuring sustainability of infrastructure and the environment etc.

In WRCPs, the major thrust is on improving the productivity of irrigation systems through renovation and modernisation of existing irrigation and drainage schemes and associated system improvements linked with farmers’ participation. Priority is given to the schemes where Water Users Associations (WUAs) are established and water services are unreliable and in equitable, resulting in agricultural productivity substantially below potential. For agricultural intensification, a package of agricultural practices is also provided under the project. The project also involves institutional reorganisation to build up the capabilities of Irrigation departments and farmer organisations.

The state-wise details are given below. The expenditure incurred by these States of WRCPs is reimbursed by the Bank.

Haryana Water Resources Consolidation Project (HWRCP)

The HWRCP has been structured as a six year operation commencing from June 1994 and targeted to complete by December, 2000. The Project is estimated to cost Rs. 1,432.99 crores (Revised).

The project envisages following works under Bhakra Canal System and Western Yamuna
Canal System (including Gurgaon Canal) :-

- Rehabilitation of existing canal system, drainage systems, water courses, augmentation tube wells (ATW), direct irrigation tube wells (DIT) and river control works.

- Modernisation of canal and drainage system, construction of the Hathnikund Barrage, link channel, feeder channel and minors to enhance effectiveness and performance and provide better and increased sustained supplies for irrigation.

- Improved operation and maintenance (O&M) of the water distribution and drainage systems including river control works, augmentation tube wells, research, design and training infrastructure.

- Institutional support for administration, data collection, planning, design & beneficiary training.

The project actually took off during 1996-97 and the cumulative expenditure up to September 2001 is Rs. 1111.54 crores which works out to 77.57%.

The World Bank has extended the project by one year upto 31.12.2001 after restructuring the project by including those activities only which could be completed within the extended period with more focus on training activities related to strengthening of existing WUAs, Participatory Irrigation Management Programme, completion of on-going contracts, contracts for water courses lining for remaining 600 courses where WUAs have already been formed, along with diversion of SDR 37.00 M(US $ 48.30 equivalent) to Gujarat Earthquake reconstruction.

**Tamil Nadu Water Resources Consolidation Project (TNWRCP)**

The TNWRCP was negotiated between the World Bank and Government of India and Tamil Nadu in April, 1995 for an assistance of US $ 282.90 million (approximately Rs. 887.50 crores). The project is to be implemented in period of six years and is estimated to cost Rs. 1067.83 crores (Revised).

The main components of the scheme are :-

- To complete 9 viable on-going irrigation, drainage and water supply schemes to augment the State’s irrigated area by 31,000 ha.

- To improve productivity through rehabilitation/modernisation of 43 existing irrigation systems integrated with participation of farmers, including turnover of Operations and Maintenance (O&M) of improved distributaries, as wells as funding of O&M, to Water Users Associations.

- To introduce multi-sectoral water planning and incorporate environmental management in all aspects of water planning and management.
Establishment of the water resources research fund within the Water Resource Organisation (WRO) for supporting water sector related research and technology development.

- Strengthening the capabilities of the Water Resource Organisation (WRO) in all functional responsibilities and management support areas in Tamilnadu.

- Implementing land acquisition and economic rehabilitation programme for about 1460 Project Affected Persons (PAPs).

The cumulative expenditure ending September, 2001 is 760.33 crores which works out to 68.31%. Due to exchange rate variation there is likely saving of SDR 47.20 M (equivalent to $ 60.8 M) against the available credit under the project. The Government of Tamil Nadu (GOTN) has proposed to utilise this amount through implementation of some additional schemes. These have been approved by the World Bank. The GOTN has also requested for a one year extension of the credit.

**Orissa Water Resources Consolidation Project (OWRCP)**

The Development Credit Agreement for the OWRCP was signed on 05.01.96. The project credit effectiveness began on 30.01.1996. The project is to be implemented in a period of six years with the World Bank credit assistance of SDR 194.80 million (US $ 290.00 million equivalent or approximately Rs. 977.00 crores). The project which is estimated to cost Rs. 1392.09 (revised) aims at improving agricultural productivity through modernisation and rehabilitation of existing irrigation projects by improving their operation efficiency through participatory management; completing ongoing prioritised irrigation projects and institutional strengthening. The concept of farmers turnover will receive special attention under the project. After completion of the project, an area of 66,830 ha. will be brought under irrigation and 1,67,000 ha in the old delta system will also be brought under irrigation. Satisfactory progress has been made in implementation of other components of the project i.e. water planning and environmental action plan, institutional strengthening, resettlement and rehabilitation etc. The performance of the scheme completion component has been very good. The cumulative expenditure ending September, 2001 is 901.66 crores which works out to 64.77%.

**WATER AND LAND MANAGEMENT INSTITUTES (WALMIs)**

A number of Water and Land Management Institutes/ Indian Management Training Institute (WALMIs/IMTI etc.) were established in various States during the 80s through technical and financial collaboration between the concerned State and USAID. It was envisaged that these WALMIs could help irrigation departments to train Irrigation System Managers and to improve the efficiency of water use in irrigated commands, canal
commands in particular.

A conference of the Directors of Water and Land Management Institutes (WALMIs) and officers of the concerned ministries and organisations of Govt. of India was held at New Delhi on 22.8.2001 to review the working of WALMIs and consider the various possibilities of reviving these organisations through diversification of their activities, improving their structure, personal management as well as their financial status.

**WATER QUALITY ASSESSMENT AUTHORITY**

In view of the multiplicity of agencies involved in water management in the country with no virtual co-ordination among them, the problem of pollution of national water resources has become a matter of serious concern. To circumvent the situation, the Ministry of Environment & Forests (MOEF), Government of India, on the advice of Ministry of Water Resources (MoWR), has issued a notification in the “The Gazette of India”, dated 22nd June, 2001 constituting the “Water Quality Assessment Authority (WQAA)” with effect from 29th May, 2001. The 12-member Authority is headed by the Secretary, Ministry of Environment & Forests as the Chairman and the Commissioner (Water Management), MOWR as the Member Secretary. The other members comprise senior officials from the Ministry of Agriculture & Co-operation, Ministry of Urban Affairs and Poverty Alleviation, National River Conservation Directorate, Central Ground Water Authority, Central Water Commission, Central Pollution Control Board, Indian Agricultural Research Institute, and the National Environmental Engineering Research Institute.

The gazette notification on the constitution of WQAA inter-alia recognizes the need for constitution of State level “Water Quality Review Committees”, and the importance of water quality monitoring through an extensive network at national and state levels, keeping in view the contribution of the Hydrology Project (HP) of 6-year duration, initiated in 1996 by the MoWR in 9 States in the peninsular region of the country, in standardizing and unifying the process of monitoring to bring the concerned agencies under one umbrella. The notification empowers the Authority to issue directions to agencies sub section 2 of Section 3 of the Environment Protection Act, 1986.
A breakthrough in India-Nepal cooperation was achieved during the 4th meeting of the Joint Team of Experts (JTE) held at Kathmandu in October 2001 during which the Joint Inception Report on the “Sapta Kosi High Dam Multipurpose Project and Sun Kosi Storage-cum-Diversion Scheme” has been finalised, paving the way for setting up of Joint Project Office and taking up field investigations for preparation of Joint Detailed Project Report.

The memorandum of Understanding between the Ministry of Water Resources, the Republic of India and the Ministry of Water Resources, the People’s Republic of China was signed on 14th January, 2002 for sharing of Hydrological information on the Yaluzangbu/ Brahmaputra river in flood season by China to India. The MOU was signed by Secretary (WR) on behalf of Government of India.
INDO-BANGLADESH JOINT RIVERS COMMISSION

A new chapter in the Indo-Bangladesh relations opened up with the signing of the Indo-Bangladesh Treaty by the Prime Ministers of India and Bangladesh on 12th December, 1996 on the sharing of Ganga waters for a period of thirty years. As a follow up of the Treaty, Joint Committees have been set up on both sides for monitoring its implementation. During 2001-2002, three meetings of these Committees have been held. Joint measurements on Ganga at Farakka and Ganges at Hardinge Bridge during lean season (Jan-May 2001) were conducted to the satisfaction of both the countries.

The existing system of transmission of flood forecasting data on major rivers like Ganga, Teesta, Brahmaputra and Barak during the monsoon season from India to Bangladesh was continued. The transmission of flood forecasting information from India during the monsoon has enabled the Civil and Military authorities in Bangladesh to shift the population affected by flood to safer places.

INDO-NEPAL COOPERATION

There is considerable scope for cooperation between India and Nepal in the field of Water Resources, particularly in the field of hydropower development, by utilising the abundant potential of the northern tributaries of the Ganga flowing from Nepal to India. Several projects have been identified and negotiations have been going on. With the signing of the Treaty on the Integrated Development of Mahakali River in February 1996, which came into force from June 1997, negotiations for implementation of the Pancheshwar Multipurpose Project started gaining momentum, and various meetings of the Indo-Nepal Joint Group of Experts (JGE) took place. In accordance with the decision of the JGE and as per administrative approval and expenditure sanction of the Public Investment Board, a Joint Project Office at Kathmandu and field offices in India were opened for the purpose of preparing joint Detailed Project Report (DPR) of Pancheshwar Multipurpose Project. The work of preparation of DPR jointly by India and Nepal was continued during the year. The DPR is likely to be finalised by June 2002.

The Government of India had also taken up with Nepal the undertaking of Joint Investigation of the Sapta Kosi High Dam Multipurpose Project and Sun Kosi Storage cum anti-erosion scheme. A Joint Team of Experts (JTE) of India and Nepal has been discussing these projects, which has so far held 4 meetings. A break through in talks, were achieved during the 4th meeting of the JTE held at Kathmandu in October, 2001 during which the Joint Inception Report on the above
projects has been finalised, paving the way for setting up of a Joint Project Office and taking up field investigations for preparation of the Joint Detailed Project Report.

Other initiatives taken with regard to cooperation with Nepal are as under :-

With a view to discuss important issues pertaining to co-operation in the field of Water Resources, including implementation of existing agreements and understandings a Nepal-India Joint Committee on Water Resources (JCWR) headed by Water Resources Secretaries of both the countries is also functioning, with the mandate to act as an Umbrella Committee of all committee and groups. First meeting of the JCWR was held at Kathmandu, Nepal on October 1-3, 2000. The next meeting is likely to be held in early 2002.

The JCWR in its meeting held in October, 2000 had suggested that the Joint Team of Experts (JTE) on extension of embankments and the Joint Committee on Embankment construction be merged and reconstituted as a Sub-Committee on embankment construction. This committee will look into planning, design and construction of embankments. Accordingly, the Sub-committee on embankment construction (Indian side) was constituted on 3.1.2001. This Joint Sub-Committee on embankment construction has so far held two meetings, the last meeting being held during 11-15 April, 2001.

An India-Nepal Joint Committee on Flood Forecasting (CFF) has also been constituted during the year to review the existing the flood forecasting system on rivers common to India and Nepal and prepare a comprehensive flood forecasting Master Plan. The CFF held its first meeting at New Delhi in April, 2001. Subsequently, a Joint Task Force (JTF) was constituted to prepare a Joint document in this regard. The JTF has held two meetings so far. The second meeting was held in November, 2001 at Lucknow. Initiatives have also been taken so as to obtain real time data from gauge stations located in Nepal. In this regard an Indian Team of Experts visited Nepal in October, 2001 to identify important locations for obtaining real time data directly, to benefit forecasting activities in India.

Letters have been exchanged between Government of India and His Majesty Government of Nepal regarding setting up of a single Joint Committee on the Kosi and Gandak Projects by dissolving the existing separate Committees on these projects. The above Committee has been formed to review and take necessary measures on issues pertaining to the operation and maintenance of the Kosi and Gandak Projects. The first meeting was held during December 2001 at Kathmandu, Nepal.

**INDO-PAKISTAN COOPERATION**

Under the Indus Waters Treaty, 1960 India and Pakistan have created two permanent posts of Commissioner for Indus Waters, one each in India and Pakistan. Each Commissioner is representative of his
Government for all matters arising out of the Treaty and serves as the regular channel of communication on all matters relating to implementation of the treaty. The two Commissioners together form the Permanent Indus Commission. The 86th annual meeting of the Permanent Indus Commission was held at Lahore/ Islamabad during May/June 2001 to finalise its report for the year ending 31.3.2001 for submission to respective Governments of India and Pakistan.

Flood warning arrangements were made by India through priority Telegrams, Telephones and Radio Broadcasts for the benefit of Pakistan during the period from 1st July to 10th October, 2001 for the Indus system of rivers.

**INDO-BHUTAN COOPERATION**

The cooperation with Royal Government of Bhutan continued in respect of the works for hydro-power development and establishment of a hydro-meteorological and flood forecasting network on rivers common in India and Bhutan. A scheme titled “Comprehensive Scheme for Establishment of Hydro-meteorological and Flood Forecasting Network on rivers common to India and Bhutan” is in operation. A Joint Experts Team (JET) consisting of officials from the Government of India and Royal Government of Bhutan meets at regular intervals every year alternatively in India and Bhutan to review the progress and other requirements of the scheme. So far 14 meetings of the JET have been held. The last meeting in this regard was held at Thimpu in September, 2001. The scheme is fully funded by the Government of India. A High Level Committee meeting between the two countries was also held at Thimpu in September, 2001 to review the scheme and its continuation during Xth Plan period.

The matter relating to problem of floods created by rivers originating from Bhutan and coming to India has also been taken up with the Ministry of External Affairs. The Ministry of Water Resources has proposed to set up a High Level Technical Committee for this purpose. The Ministry of External Affairs has intimated that this issue is under process with Royal Government of Bhutan.

**INDO-CHINA COOPERATION**

Following the flash floods in the Siang/ Brahmaputra rivers in Arunachal Pradesh in June, 2000 and thereafter in the Sutlej in Himachal Pradesh in August, 2000, the issue was taken up with the Govt. of China through the Ministry of External Affairs. Accordingly, the first round of India-China dialogue on information sharing on natural disasters in common rivers, was held at Beijing (China) on 8th June, 2001. The Indian side stressed the need for hydrological data on both the Brahmaputra and the Sutlej on a year round basis to reduce the human suffering on our side in the event of natural disasters. The Chinese side proposed provision of rainfall, water level and discharge data on the Brahmaputra during the flood season. Discussions are continuing between both the Governments through the Ministry of External Affairs.
Affairs for entering into a Memorandum of Understanding in this regard in the near future.

**FLOOD CONTROL AND RELATED MATTERS**

**Central Assistance**

A Centrally Sponsored Scheme, namely, “Critical anti-erosion works in Ganga Basin States and Raising and Strengthening of Embankments along Kosi and Gandak Rivers” had been cleared at an estimated cost of Rs.159.33 crore for providing Central assistance to the States of Uttar Pradesh including Uttrakhand, Bihar and West Bengal as well as to the Farakka Barrage Project Authority (FBPA) which includes Rs.110.00 crore as Central Share for undertaking anti-erosion works of critical nature. Central assistance under this scheme is in the form of grant to the concerned States in the ratio of 75:25 between the Centre and the State and 100% funding for FBPA. During 2000-2001 an amount of Rs.20.00 crore has been released as grant-in-aid to Government of Uttar Pradesh, Uttrakhand, West Bengal and Bihar for taking up critical anti-erosion works in Ganga Basin. For the financial year 2001-02 an amount of Rs.20.00 crore has been kept in the budget estimate.

Two more Centrally Sponsored Schemes, namely, (i) “Critical anti-erosion works in Coastal and other than Ganga Basin States” and (ii) “Flood Control Schemes in Brahmaputra and Barak Basin”, were formulated at an estimated cost of Rs.39.97 crore and Rs.55.56 crore, respectively which were approved by EFC. However, both the schemes were awaiting approval of the Planning Commission are now required to be re-proposed during the Tenth Five Year Plan.

Drainage congestion in the Mokama Group of Tals in Bihar has been causing concern in the past. In this regard, the Planning Commission had conveyed “in-principle-approval” for taking up one component of works costing Rs.3.00 crore as a Pilot Scheme, titled, “Improvement of drainage in Mokama Group of Tals in the Kiul-Harorhar river system in Ganga river system.” This scheme was executed through M/s National Projects Construction Corporation under the supervision of the Ganga Flood Control Commission.

Central Assistance was also provided against other Centrally Sponsored Schemes namely (i) Flood Proofing Programme in North Bihar, (ii) Flood Protection works of Kosi and Gandak Projects, (iii) Extension of embankments of Lalbakeya, Kamla, Bagmati and Khando rivers, etc.

**Constitution of Committees**

During the year 2001-02 action was initiated to constitute the following Expert Committees:-

- An Expert Committee to study the problem of silting in rivers under the Chairmanship of Dr. B.K. Mittal, former Chairman, Central Water Commission
An Expert Committee to review the implementation of Rashtriya Barh Ayog (RBA) under the Chairmanship of Shri R. Rangachari, Former Member (RM), Central Water Commission, has been set up with the objective of reviewing the present status of implementation of recommendations of RBA.
The Cauvery River Authority held its 3rd meeting on 10.10.2001 and after taking note of the drought conditions in the basin in both States, the Authority directed the Government of Karnataka to ensure inflows of Mettur as stipulated by the Tribunal especially in view of the situation being faced in the Cauvery basin of Tamil Nadu. The Authority also decided that storage position in Karnataka and Tamil Nadu be reviewed by the Cauvery Monitoring Committee on a monthly basis and if the situation warrants, it would recommend for convening an emergency meeting of the Authority. The Authority decided to work out an acceptable and equitable procedure for pro-rata sharing of the distress and accordingly requested the basin States to put forward their specific suggestions for consideration by the Authority.
CAUVERY WATER DISPUTE

Use and development of Cauvery waters were regulated by agreements of 1892 and 1924 between the erstwhile Princely State of Mysore and province of Madras. The State of Kerala was not a party to these agreements. With the re-organisation of states in 1956, the former Princely state of Coorg, which was partly in the Cauvery basin, became part of Karnataka and some areas of Malabar in Madras State in the Cauvery basin became part of Kerala. The then French territory of Pondicherry which is also served by Cauvery became a Union Territory. Thus presently, Kerala, Karnataka, Tamil Nadu and Pondicherry are interested State for using Cauvery Waters.

The 1924 Agreement became open for review at the end of 50 years in the light of experience gained and further possibility of extension of irrigation etc. For more than two decades, sharing of Cauvery waters among the basin States remained under discussion/negotiations bilaterally between Karnataka and Tamil Nadu with mediation of the Centre, but no solution could be found.

The Government of Tamil Nadu made a formal request to the Central Government in July 1986 under the provisions of Inter State Water Disputes Act., 1956 for constitution of a Tribunal. Efforts were continued to resolve the dispute by interacting with the Cauvery basin States. However, in view of the uncompromising attitude adopted by the concerned States and the directions given by the Supreme Court, the Central Government came to the conclusion that there was no possibility of resolving the dispute by continuing the negotiations. In accordance with Section 4 of the Inter State Water Disputes Act, 1956, the Central Government considered the request received from Tamil Nadu under Section 3 of the Act and decided to constitute the Cauvery Water Disputes Tribunal for adjudication for the Cauvery Waters Dispute and to refer the complaint of Government of Tamil Nadu to it for adjudication. A notification to this effect was issued on 2nd June, 1990.

The Tribunal was set up with its Head quarters at New Delhi consisting of
Interim order of the Tribunal

In pursuance of the direction given by the Supreme Court, the Tribunal heard the matter and passed an interim order on 25th June, 1991. The brief contents of the interim order:

(i) The State of Karnataka shall release water from its reservoirs in Karnataka so as to ensure that 205.00 TMC (Thousand Million Cubic Metres) of water is available in Tamil Nadu’s Mettur Reservoir in a year from June to May. This will be effective from 1st July, 1991.

(ii) The State of Karnataka shall regulate the releases from their reservoirs during the year to ensure monthly inflows into Mettur reservoir as given in the order.

(iii) In respect of each month the releases shall be made in 4 weeks in four equal installments. If in a particular week, it is not possible to release the required quantum of water, the said deficit shall be made good in the subsequent week.

(iv) 6.00 TMC of water for Karaikal region of the Union Territory of Pondicherry shall be delivered by the State of Tamil Nadu in a regulated manner.

(v) The State of Karnataka shall not increase its area under irrigation by the waters of river Cauvery beyond the existing 11.20 lakh acres.

The above order will remain operative till the final adjudication of the Dispute, referred to the Tribunal.

After obtaining opinion of the Supreme Court the interim order was gazetted on 10.12.1991.

Cauvery Water Disputes Tribunal (CWDT) Clarifications of April, 1992 and December, 1995

On 3rd April, 1992 while disposing off the civil miscellaneous petition filed by the State of Karnataka for its explanation/clarification on the interim order, the Tribunal has stated that no interference is called for in their
order dated 25th June, 1991. However, in case hereinafter there is any change of circumstance or undue hardship is caused in a particular year to any party, it will be open to such party to approach the Tribunal for an appropriate order. On 19th December, 1995, while disposing off the civil miscellaneous petition filed by the state of Tamil Nadu for implementation of interim order, the Tribunal further clarified that their order dated 25th June, 1991 clearly spells out that the deficiency in a particular week has to be made good in a subsequent week and not necessary within a particular month in which the deficit occurs. Until the deficit is made good, the deficit would accumulate. In a particular year, shortfall or excess in releases would have to be adjusted in an appropriate manner before the close of the particular season. Distress as contemplated in the Order dated 3rd April, 1992 does not envisage that same will be in relation to a particular month. In deciding whether the distress situation prevails, one ought to consider the precipitation in the entire season and not mere slackness in rains in any particular month or months.

In the meanwhile Shri Chittatosh Mookerjee, the Chairman of the Cauvery Water Disputes Tribunal (CWDT) submitted his resignation w.e.f. 01.07.1996 on personal grounds. Justice N.P. Singh has since been nominated as the new Chairman of the CWDT, and he joined the Tribunal on 11.12.1996. The Tribunal has been holding regular hearings since then and by now has concluded cross-examination of all witnesses produced by the party States. The Tribunal has commenced arguments on the dispute from January, 2002.

Cauvery River Authority

On 14th May, 1992, Government of Tamil Nadu filed an Original Suit No.1 of 1992 in the Supreme Court on the grounds that Karnataka was not following the directives given by the Cauvery Water Disputes Tribunal in its interim order dated 25.06.1991, and prayed inter-alia to pass a decree of mandatory injunction directing the Union of India to frame a scheme making provisions for all matters necessary to give effect to the decisions of the Tribunal and to issue a notification thereof in the Official Gazette. In pursuance of the order given by the Supreme Court the Central Government notified a scheme called “Cauvery Water Scheme” under Section 6-A of the Inter-State Water Disputes Act, 1956 on 11.08.1998, to give effect to the Interim Order and all subsequent orders. The Cauvery River Authority is chaired by Hon’ble Prime Minister and Chief Ministers of basin States are Members. Secretary Ministry of Water Resources is secretary of the Authority. The Authority is assisted by Monitoring Committee which is headed by Secretary Ministry of Water Resources. Chief Secretaries and Chief Engineers of Cauvery basin States and Chairman, Central Water Commission are Members of the committee.

The Cauvery River Authority has held three meetings so far, first meeting on 28.10.1998, the second meeting on 14.07.2000 and third meeting on
10.10.2001. In the 3rd meeting, after taking note of the drought conditions in the basin in both States, the Authority directed the Government of Karnataka to ensure inflows at Mettur as stipulated by the Tribunal especially in view of the situation being faced in the Cauvery basin of Tamil Nadu. The Authority also decided that storage position in Karnataka and Tamil Nadu be reviewed by the Cauvery Monitoring Committee on a monthly basis and if the situation warrants, it would recommend for convening an emergency meeting of the Authority. The Authority decided to work out an acceptable and equitable procedure for pro-rata sharing of the distress and accordingly requested the basin States to put forward their specific suggestions for consideration by the Authority.

The Cauvery Monitoring Committee has held 10 meetings so far. The 10th meeting of the Monitoring Committee was held on 28.12.2001. The 11th meeting of Monitoring Committee is proposed on 12.02.2002 for follow up on the decisions taken in the 3rd meeting of Cauvery River Authority.

REASSESSMENT OF WATER AVAILABILITY IN SONE BASIN

The Bansagar Agreement of 1973 has allocated 7.75, 5.25 and 1.25 MAF (Million Acre Feet) of Sone waters between the basin States of Bihar, Madhya Pradesh and Uttar Pradesh respectively. The agreement provided for setting up a special river Commission for study of Sone river to draw a comprehensive plan for the region taking into account any readjustments in the use of waters considered necessary by the States.

The Sone River Commission, constituted in pursuance of 1973 Agreement, submitted its final report in 1987 which brought out, inter-alia, that the basin yield upto Sone Barrage at Indrapuri at 75% dependability, may reasonably be considered as 20.19 BCM (Billion Cubic Metres) (16.37 MAF) and that water requirement for thermal power generation and domestic consumption has emerged as a significant development in the basin States since the agreement was signed in 1973.

The recommendations of the Sone River Commission were discussed in several Inter State meetings held subsequently in connection with formulation of various water utilization projects of the basin States viz. Kadwan and Kanhar reservoir projects and Zamania Pump Canal scheme etc. However, the concerned States could not arrive at any amicable conclusion on the issues concerning water availability of the basin. While Uttar Pradesh was in favour of accepting the yield recommended by Sone River Commission, Bihar and Madhya Pradesh preferred to stick to the earlier assessment of 17.58 BCM (14.25 MAF) until and unless the study was extended further and include additional information up to date.

Under the Reorganization Act, 2000 of Madhya Pradesh and Bihar, the newly formed States of Chhattisgarh and Jharkhand have also became the co-basin States of the Sone
basin in addition to the Uttar Pradesh, Madhya Pradesh and Bihar. An Inter-State meeting of these five States chaired by the Chairman, Central Water Commission regarding sharing and utilization of Sone river waters was held on 02.07.2001 in which the representative of Bihar put forth the disagreement of the Government of Bihar to the revision of yield of the Sone basin. The issues regarding the constitution of the proposed Ganga and Sone Management Board, Inter State River Water Board are to be bilaterally discussed by Jharkhand with Bihar and Chhattisgarh with Madhya Pradesh respectively. Regarding the five projects pending for clearance in the Sone basin the concerned States would discuss further and resolve the issues amicably.

PROPOSED AMENDMENT IN THE INTER-STATE WATER DISPUTES ACT, 1956

The Inter-State Water Disputes Act, 1956 was enacted to provide for the adjudication of disputes relating to waters of inter-State rivers and river valleys under Article 262 of the Constitution. The Sarkaria Commission on Centre-State relations, set up in 1983 has given, in its report submitted in 1987, five recommendations on Inter-State River Water Disputes. These recommendations are aimed at the adjudication of the disputes by the tribunals in time bound manner as also a more effective implementation of the decisions of the tribunal. The recommendations also provide for setting up of a data bank and information system at the national level for each river basin. A Bill for amending the Inter-State Water Disputes Act, 1956 has been passed in the Lok Sabha on 03.08.2001 and transmitted it to the Rajya Sabha on the same day. The Bill could not be passed by Rajya Sabha in spite of efforts made by the Ministry. The Bill is likely to be passed during ensuing budget session of the Rajya Sabha in 2002.

RIVER BOARDS ACT, 1956

Under Entry 56 of List I of the Constitution the River Boards Act, 1956 was enacted for the establishment of River Boards for the regulation and development of Inter-State River and River valleys. The Central Government can constitute a River Board under the provision of the River Boards Act, 1956 with the concurrence of the State Governments. The Central Government has however not been able to constitute any River Board under this Act so far. The role of the River Boards as envisaged in the said Act is only advisory in nature. The National Commission for Integrated Water Resources Development Plan has recommended the enactment of a new Act called the “Integrated and Participatory Management Act” in place of existing River Boards Act, 1956.

RAVI & BEAS WATERS TRIBUNAL

The Ravi & Beas Tribunal which was constituted on 2nd April, 1986 and submitted its report on 30th January, 1987. The report was circulated in May, 1987. A further suo-moto reference was made to the Tribunal comprising references from the Central Govt. and references received from Governments of Punjab, Haryana and Rajasthan seeking explanation and guidance on certain points
in the report. The last hearing of the Tribunal was held on 18th July, 1998. Further report of the Tribunal clarifying the observations made by the beneficiary States is yet to be received.

In the meanwhile one of the Members of the Tribunal has resigned on 04.01.1999. The matter regarding filling up of the resultant vacancy is under process.

**UPPER YAMUNA RIVER BOARD**

The Yamuna Water dispute regarding allocation of the utilisable surface flows of Yamuna among the co-basin States upto Okhla was resolved by way of a Memorandum of Understanding (MoU) signed by the Chief Ministers of Himachal Pradesh, Haryana, Uttar Pradesh, Rajasthan and the National Capital Territory of Delhi on 12th May, 1994. Subsequently, a separate agreement on construction of Hathnikund Barrage on Yamuna was signed on 2nd November, 1994 and agreements on Kishau Dam on Tons river and Renuka Dam on Giri river were signed on 6th November, 1994 by all co-basin States except Rajasthan.

The Hathnikund Barrage has since become operational. While the Renuka Dam Project has been cleared from techno-economic angle subject to clearance of concerned State Government/Ministries for cost sharing, Environmental conservation and Rehabilitation & Resettlement considerations, the clearance of Kishau Dam Project has been deferred, pending establishment of its economic viability.

As per the provision in the MoU, the Upper Yamuna River Board (UYRB) with its Headquarters in the National Capital Region was constituted by the Ministry of Water Resources as a subordinate office of the Ministry. The Upper Yamuna Review Committee (UYRC) was also constituted under the Chairmanship of the Union Minister of Water Resources and the Chief Ministers of Co-basin States as Members for supervising the working of the UYRB to ensure implementation of the MoU regarding allocation of surface flow of Yamuna and to issue directions, as deemed necessary, for proper development and management of the upper reaches of the Yamuna River Basin upto Okhla. The newly created State of Uttaranchal has since been made a Member of the Upper Yamuna River Board and Upper Yamuna Review Committee.

The Upper Yamuna River Board has held twenty one meetings so far, under the Chairmanship of Member (WP&P), Central Water Commission, with the last meeting having been held on 17th July 2001. In the 21st meeting of the Board a decision on seasonal distribution of Yamuna Water upto Okhla among the basin States was finalised and the Detailed Project Reports of proposed projects/schemes, establishment of Board’s Secretariat as well as problems relating to maintenance of minimum flow in Yamuna, enroute losses in conveyance system supplying Ravi-Beas water to Delhi and short supply in Eastern Yamuna Canal were discussed.
CHAPTER 9

PROGRESSIVE USE OF HINDI AND OTHER MISCELLANEOUS ACTIVITIES

HIGHLIGHTS

● To encourage healthy competition among organisations under the Ministry for doing maximum work in Hindi, Chal Vaijayanti shield has been made Achal during the year.

● Under the above mentioned scheme first and second prizes were awarded to the WAPCOS (I) Ltd., New Delhi and Central Water & Power Research Station, Pune, respectively.

● Vigilance Awareness Week was observed beginning 31st October, 2001. On this occasion, the pledge was administered to all officers by the Secretary, Ministry of Water Resources on 31st October, 2001.

● A “Ready Reckoner of Questions & Answers on Vigilance/ Disciplinary and Allied matters” for information and guidance of the officials/ officers of the Ministry was formally released by the Secretary, Ministry of Water Resources on 31st October, 2001 on the eve of the Vigilance Awareness Week.
PROGRESSIVE USE OF HINDI AND OTHER MISCELLANEOUS ACTIVITIES

USE OF HINDI

During the year effective measures were taken in the Ministry of Water Resources for the progressive use of Hindi for official purposes. Efforts were made to ensure compliance of various orders/ instructions issued by the Department of Official Language. Along with translation of important documents, the Hindi Section of the Ministry implements the Official Language Policy of the Union Government in the Ministry and its attached and subordinate offices.

The Official Language Implementation Committee of the Ministry under the Chairmanship of Joint Secretary (Admn.) has been meeting regularly. The Committee has discussed the difficulties being faced in the use of Hindi in the Ministry and its organizations. Timely action was taken on the decisions taken in these meetings. Sufficient progress has been made in the implementation of the Rajbhasha Hindi in the Ministry.

To encourage the staff to do their work in Hindi, schemes such as (i) dictation schemes for officers, (ii) noting and drafting competitions and, (iii) award schemes for original writing in Hindi on irrigation related topics, have been implemented.

To encourage healthy competition among the organizations under the Ministry for doing maximum work in Hindi, the Rajbhasha Vaijayanti Shield has been introduced. Under this scheme, this year, first and second prizes were awarded to WAPCOS(I) Ltd., New Delhi and Central Water & Power Research Station, Pune, respectively.

Hindi Fortnight was organized in September, 2001. During the fortnight competition in Hindi Essay, Hindi Noting & Drafting, Poem recitation and Hindi debate was organized. Cash prizes and certificates were give by Joint Secretary(Admn.) to the successful candidates and to the officials who did their maximum work in Hindi.

During the year, 4 officials were nominated for Hindi training and 2 stenographers and 3 typists were nominated for Hindi stenography/typing training, respectively from the Ministry.

Hindi workshops were also organized with a view to promoting Hindi in official work. Deputy Director (Official Language) inspected offices and oversaw the compliance of Official Language Policy, and instructions were given for rectification of the deficiencies pointed out during such inspections. Regular monitoring of the work being done in Hindi in the Ministry and its attached/subordinate offices was done through quarterly reports.
Shri Mukul Joshi, Joint Secretary (Admn.), MoWR presenting “Rajbhasha Vaijayanti Award” to Shri S. Govindan, Joint Director, Central Water & Power Research Station, Pune at the closing ceremony of the Hindi Fortnight in the Ministry.

Officers of the Ministry & its attached offices present on the occasion of Hindi Fortnight celebrated in September, 2001.
**COMPUTERISATION IN THE MINISTRY**

A provision of Rs. 50.00 lakhs has been made in the budget grant under information Technology (IT) development (plan) under the Ministry of Water Resources for the year 2001-2002. The proposal for purchase of 4 servers and 22 PCs with peripherals in respect of the Delhi based Pay & Accounts Office (PAO) have been approved and purchase order has been placed. In respect of out station PAOs at CWPRS, Pune and FBP, Murshidabad, the proposal is in process.

**REDRESSAL OF STAFF GRIEVANCES**

A Grievances Redress Cell is in existence in the Ministry of Water Resources which entertains the grievances of staff of all the organisations under the Ministry. Joint Secretary (Admn.), MoWR and Deputy Secretary (Coord.), MoWR have been designated as Director of Public Grievances and Director of Staff Grievances, respectively.

Due attention is paid for disposal of grievances within a reasonable period. Most of the grievances received are related to service matters, payment of pensionary benefits etc. Out of 70 grievances received during the year, 22 have been disposed off.

The inspection of Grievances Redressal Machinery of various organisations under this Ministry is carried out annually. In the current year up to January 2002, the National Institute of Hydrology, Roorkee, has been inspected. A few more organisations are programmed to be inspected by March, 2002.

**MINORITY WELFARE**

In accordance with the guidelines issued by the Ministry of Welfare (present Ministry of Social Justice & Empowerment) in March, 1990, the Ministry is monitoring the recruitment of minority communities and representation of minorities in Selection Commissions/ Boards in the Ministry and the organisations under it.

**MONITORING OF RESERVATION FOR PHYSICALLY HANDICAPPED**

Monitoring of the recruitment of physically handicapped is being done to ensure fulfilment of three per cent quota for this category by the Ministry as well as various organisations under it. Periodic reports on the progress made are being sent regularly to the Ministry of Social Justice & Empowerment.

**MONITORING OF RESERVATION FOR SC/ST/OBC**

The Scheduled Caste/ Scheduled Tribe & Other Backward Classes (SC/ ST & OBC) Cell is functioning in the Ministry. It is assisting the Liaison Officers for SC/ ST and for OBC in monitoring and ensuring major implementation of the policies/ orders concerning representation of SC/ ST/ OBCs in Government service, and for making suitable recommendations, wherever necessary, to make good the shortfall of representations of SC/ ST/ OBCs. The Administration Wing had also visited some offices for inspection of rosters maintained for
OBC/ SC/ ST and tendered requisite advice wherever it was necessary.

**COMMITTEE ON SEXUAL HARASSMENT OF WOMEN EMPLOYEES**

In accordance with the guidelines laid down by Supreme Court to tackle sexual harassment of women employees, a Committee has been constituted to look into the complaints of the women working in the Ministry of Water Resources. The Committee submits its finding to the Joint Secretary (Admn.) for necessary action. The Committee also prepares an Annual Report of the complaints received and action suggested by the Committee.

*The Committee was reconstituted on 18.07.2001 with Director (E), Ministry of Water Resources as the Chairperson*

The Committee has held its meetings from time to time and met the women employees in the main Ministry and its organisations in Delhi to find out if they have any complaints regarding sexual harassment. During the year no formal complaints were received by the Committee. However, oral complaints of minor nature were received which were locked into and resolved to their satisfaction of the complainants.

**VIGILANCE ACTIVITIES**

The Vigilance Unit in the Ministry of Water Resources functions under the supervision and control of the Chief Vigilance Officer. There are a total of 15 organizations under the Ministry, comprising of two Attached Offices, six Subordinate Offices, three Statutory Bodies, two Public Sector Undertakings and two Registered Societies. The Vigilance Division of this Ministry is looking after various aspects of vigilance and disciplinary matters of all employees of the Ministry of Water Resources (proper) and all Group-A officers of all the organizations under the administrative control of this Ministry, besides keeping a watch on such matters of all other officers / officials and tendering advice to all Attached and Subordinate Offices, PSUs, Statutory Bodies, Registered Societies etc. in consultation with CVC and other administrative bodies viz. UPSC, Department of Legal Affairs, DOPT etc. wherever necessary.

The CVC and the DOPT, in their effort to bring about a greater transparency in vigilance administration and speedy disposal of cases, have been suggesting several measures through their administrative Instructions. Various instructions received from them have been circulated amongst all CVOs / VO s of the organizations under the administrative control of this Ministry for strict compliance. For speedy disposal of cases, the Chief Vigilance Officer and other senior officers of the Ministry are regularly reviewing the pending status of all vigilance cases. In this connection, the Quarterly Executive Summaries of all pending vigilance / disciplinary / appeal & review are submitted to the Secretary (WR) for perusal and review. Besides, various periodical returns are also sent timely to the CVC/ DOP&T/ PMO for review. The Heads of the
Organizations under the Ministry have also been advised to impress upon all concerned Disciplinary Authorities / Investigating Officer / Inquiring Authorities & Presenting Officers to give due priority to vigilance / disciplinary cases and stick to the prescribed time limit of Central Vigilance Commission and conform to the instructions laid down in the CVC’s Vigilance Manual and other statutory rules. With a view to completing the inquiries within the prescribed time schedule, this Ministry has also engaged retired officers as the Inquiring Authorities in several vigilance cases, from the panel of the CVC. Special attention has been paid to the expeditious disposal of the complaints received through the Prime Minister’s Office, Central Vigilance Commission and VIPs.

During the year, a total of 119 cases were dealt in the Ministry including 11 references from the Prime Minister’s Office and 28 references from the Central Vigilance Commission. Out of these, a total of 41 new references / complaints, including 3 PMO references and 7 CVC references, were received during the current financial year. Of these 119 cases, 54 cases/ references were finally disposed of /closed after taking appropriate action. During the year, seven charge-sheets for major / minor penalty proceedings were issued to charged officers. Major penalty was imposed upon as many as 8 officers while minor penalty was imposed on one officer. In one case, prosecution sanction has been issued with the approval of the Competent Authority. In eight cases, charges were dropped and in respect of five officers warnings were issued for their respective misdemeanour. Besides, as many as nine officers were suspended on the recommendations of the Vigilance Division of the Ministry and further disciplinary action is being taken against them. The requests for vigilance clearance received from various wings of the Ministry were also examined with reference to the records of the vigilance division and clearance was given to those officers against whom no disciplinary proceedings were pending. During the year, more than a thousand vigilance clearance certificates were issued.

Apart from the above, during the current financial year as many as seven appeals / revision /review petitions were dealt with in the Ministry. Besides, a total of 11 Court / CAT cases relating to appeals and applications of the charged officers were also looked after in the Ministry. The Vigilance Wing is involved in the work of preparation of counter replies, drafting writ petitions/appeals and other miscellaneous applications, besides briefing the counsels in each case on each date of hearing.

During the year, a major case of misconduct, involving embezzlement/ defalcation of several lakhs of rupees was unearthed in the Central Water Commission. Since the case involved criminal action, an FIR /RC has been lodged with the Central Bureau of Investigation who have taken up the matter for investigation. Prima-facie, it has been established that a total of about 17 officers including some senior officers are involved in the case. Out of these, a total of 12 officers of the Accounts Wings
(both CWC and Ministry) and CWC (proper) have been placed under suspension. The Vigilance Division of the Ministry and the CWC are now assisting the CBI in bringing the guilty to book. The matter has also been taken up with the Controller General of Accounts and Controller of Accounts, MOWR for appropriate disciplinary action against some of the officers of the CGA/Accounts Wing.

This Ministry also undertakes “Preventive Vigilance Inspection” of various officers of the organizations under the Ministry. While reviewing the old vigilance cases, it was observed that in most of the cases, major irregularities were committed by the official/officers because of the lack of knowledge and understanding in Government norms, and sometimes due to lack of supervision and watchfulness. With a view to reducing the number of vigilance cases, detecting corruption prone areas, pruning out the malpractices and bringing better co-ordination among the officers, such preventive Vigilance Inspections were conducted by the team of the Vigilance Division. During the current financial year, Preventive Vigilance Inspections of the offices of Narmada Control Authority, Indore & Bhopal; National Water Development Agency, Hyderabad; National Institute of Hydrology, Roorkee; Sardar Sarovar Construction Advisory Committee, Vadodara and Betwa River Board, Jhansi were conducted. The recommendations suggested by the team of the Vigilance Division are being scrupulously followed by the said organizations.

*Release of “the Ready Reckoner of Questions and Answers on Vigilance/ Disciplinary/ Allied matters” by Secretary(W R) on the eve of the Vigilance Awareness Week.*
As per the instructions of the CVC/Ministry of Home Affairs, the Vigilance Division of the Ministry is also preparing and maintaining “List of Officers of Doubtful Integrity” and “Agreed List” in consultation with the Central Bureau of Investigation. Efforts have been made not to assign any sensitive positions to the suspected officers appearing in these lists.

The Central Vigilance Commission also has been stressing upon the need of a systematic campaign involving all members of the civil society against the corrupt officers/public servants with a view to eradicate corruption. In this regard, CVC had advised all the Ministries/Departments that the week beginning from 31st October every year should be observed as VIGILANCE AWARENESS WEEK. Like last year, this Ministry also observed Vigilance Awareness Week this year.

On this occasion, “A Ready Reckoner of Questions & Answers on Vigilance / Disciplinary and Allied Matters” for the information and guidance of the official/officers was prepared and issued by the Vigilance Wing of the Ministry. Copies of the Ready Reckoner were also circulated to all Heads/CVOs/VOs of the organizations under the Ministry and all Chief Secretaries of States/Union Territories. The Minister (WR) and the Central Vigilance Commissioner have also appreciated the efforts of the Vigilance Wing in bringing out this journal on the eve of the Vigilance Awareness Week. The Central Vigilance Commissioner in his special message to the Ministry has stated that -

“I am delighted to learn that the Ministry of Water Resources is issuing a Ready Reckoner in the form question/answers relating to different aspects of vigilance, disciplinary and allied matters on the eve of the Vigilance Awareness Week.

In fact, many a time, the corrupt and the guilty escape because of procedural deficiency in the disciplinary action taken. The Ready Reckoner, I am sure, meets a very important need especially for those discharging the direct responsibility of inquiring into cases of vigilance and also disciplinary authorities.

I appreciate and welcome the initiative taken by the Ministry of Water Resources. I am sure, the Ready Reckoner is going to be of immense value in improving vigilance awareness in government.”

In pursuise of the goal of efficient management and tracking of cases of disproportionate assets, the Vigilance Division of Ministry has introduced an effective mechanism for ensuring enforcement and timely submission of the Annual Immovable Property Returns (APRs) by all Group “A” and Group “B” officers of this Ministry and its organizations as stipulated in the CCS (Conduct) Rules, according to which the officer while submitting their resume for the Annual Confidential Report has to indicate the acknowledgement number and date issued by the Vigilance Section in token of having received their APRs. This fact has also been incorporated in the Annual Confidential Report (ACR) form. The concerned Reporting Officers have also been advised
to ensure that unless Column 4 of Part –II of ACR form contains the above information, the ACR will not be reported upon. At the end of the financial year – 2000-01, most of the officers (both Group–A and Group-B) working in this Ministry and its organizations submitted their Annual Property Return in time. Similar efforts have already been initiated for timely submission of the APRs by all the officers of the Ministry and its organizations. During the financial year 2001-2002, all the information about the movable properties submitted by the officers/officials of the Ministry were examined in detail and necessary information sought where doubts emerged on subsequent examination of the cases.

The Vigilance Division of the Ministry is committed to effective functioning of the vigilance administration of the Ministry and its organizations and all out efforts are being made to further streamline the process. In this connection, necessary steps have already been taken to ensure that the positions of the Chief Vigilance Officers and Vigilance Officers of the Organizations under the Ministry do not remain vacant for long. Concerted efforts are also being made towards detecting the corruption-prone areas and eradicating the evils of the corruption and other malpractices.
CHAPTER 10

CENTRAL WATER COMMISSION

HIGHLIGHTS

- Detailed designs and drawings of various components of different types of hydraulic structures were prepared for 93 projects.
- The Central Water Commission (CWC) maintained 953 Hydrological Observations sites all over the country.
- The CWC operated 159 flood forecasting stations spread over 8 major river basins. On an average over 6,000 forecasts are being issued every year. Daily flood bulletins and weekly flood news letters were issued during the flood season.
- A Hydro meteorological network of 37 sites has been commissioned in Nepal.
- A Hydro meteorological network of 29 sites was established in Bhutan.
- 11 projects are under investigation in the North Eastern region.
- 31 Major Irrigation Projects, 27 revised Major Irrigation Projects and 46 Medium and 25 revised medium Irrigation Projects were under appraisal in CWC. 8 projects were accepted by the Advisory Committee during 2000-2001.
- The CWC is presently monitoring 199 Major, Medium and extension/renovation/modernisation (ERM) projects.
- 70 important reservoirs having total live storage of 130.55 bcm (billion cubic metre) were monitored on weekly basis.
- Water availability aspects of 3 Thermal Power Projects with installed capacity of 2336.62 MW were examined and cleared.
- One Hydro-electric project with installed capacity of 70 MW was examined and cleared.
- 123 projects under Accelerated Irrigation Benefit Programme (AIBP) are being monitored by CWC.
- The CWC provided technical assistance to the Ministry of Water Resources to settle the inter-state water disputes in respect of the Cauvery Water Dispute, Ravi-Beas Water Dispute and the Sone Water Dispute.
ORGANISATION AND FUNCTIONS

The Central Water Commission (CWC), an attached office of the Ministry of Water Resources, is the apex technical organization in the country for development of water resources. The Commission is responsible for initiating, coordinating and furthering, in consultation with the State Governments, schemes for control, conservation, development and utilization of water resources throughout the country for the purpose of irrigation, flood management, power generation, navigation etc. Implementation of the National Water Policy is another important concern of the Commission. Over the years, the Commission has developed the technological know-how in planning, investigation, appraisal, design construction of projects for development of water resources, monitoring and management of projects, hydrological observations and flood forecasting.

The Commission is headed by a Chairman with the status of Ex-officio Secretary to the Government of India and three Members with the status of Ex-officio Additional Secretary to the Government of India. The three Members head the three technical wings namely, Design & Research Wing, Water Planning and Project Wing and River Management Wing. There are two units separately for Human Resources Management and Training headed by two Chief Engineers functioning under the overall control of the Chairman.

Thirteen regional field organizations of the Commission are functioning at Bangalore, Bhopal, Bhubaneshwar, Chandigarh, Coimbatore, Delhi, Hyderabad, Lucknow, Nagpur, Patna, Shillong, Siliguri and Vadodara, each headed by a Chief Engineer, which are responsible for monitoring of major and medium projects and appraisal of medium projects of the region, in addition to flood forecasting and hydrological observations. Monitoring of Command Area Development Programme in certain projects, minor irrigation schemes and other water management activities have also been added to these responsibilities.

DESIGN AND RESEARCH WING

Design and Research (D&R) wing is one of the most active wings of Central Water Commission. Apart from technical appraisal of water resources development projects prepared by different agencies, the various units of the wing are actively associated with design consultancy, technical studies and research & development activities in the field of water resources.
Major activities of D&R wing may be classified as:

- Design of water resources Hydraulic structures;
- Hydrological studies;
- Review and planning of safety aspects of dams; and
- Research, development and training.

**DESIGN OF WATER RESOURCES HYDRAULIC STRUCTURES**

The D&R wing of CWC is actively associated with the design of almost all the major water resources projects either through consultancy or during the process of technical appraisal.

The following four design units have been identified to cater to specific requirements and to attend to special design related problems of different regions:

1. Design (North & West) unit
2. Design (North - West & South) unit
3. Design (East & North East) unit
4. Design (Narmada Basin) unit

Each of the units have specialised Directorates such as Hydel Civil Design (HCD) Directorate, Concrete & Masonry Dam Design (CMDD) Directorate, Embankment Dams Design Directorate, Gates Design Directorate and Barrage and Canal Design Directorate etc.

**Project Appraisal**

So far Detailed Project Reports (DPRs) in respect of 23 new projects submitted by various State Governments and other agencies have been technically examined in the D&R Wing during the year. In addition, examination of replies or further studies in respect of 37 projects (which were earlier referred and examined in CWC) have also been carried out. The State-wise break up of the various projects is shown in Figure 1.

**Detailed Design and Preparation of Drawings**

Different categories of projects for which detailed designs have been carried out and drawing of various components of different types of hydraulic structures have been prepared on priority basis during the year 2001-2002 are as follows:

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Category</th>
<th>No. of Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Projects at construction stage.</td>
<td>75</td>
</tr>
<tr>
<td>2.</td>
<td>Project at investigation and planning stage (for which detailed project report are being prepared)</td>
<td>18</td>
</tr>
</tbody>
</table>

In addition, specific problems in respect of 25 projects (for which design consultancy etc. were provided earlier) were also referred to the D&R Wing from time to time. The State-wise break up of all the 118 projects is shown in Figure 2.

Some of the important projects which are presently being dealt in D&R wing are as follows:
STATEWISE DISTRIBUTION OF THE PROJECTS TECNICALLY EXAMINED IN D&R WING
CONSULTANCY PROJECTS IN D&R WING

Figure 2

- BHUTAN (2)
- WEST BENGAL (2)
- UTTAR PRADESH (1)
- UTTARANCHAL (2)
- TRIPURA (1)
- TAMILNADU (2)
- SIKKIM (1)
- RAJASTHAN (10)
- PUNJAB (1)
- ORISSA (4)
- NAGALAND (3)
- MIZORAM (3)
- MEGHALAYA (5)
- MANIPUR (4)
- MAHARASHTRA (1)
- ANDAMAN & NICOBAR (3)
- ANDHRA PRADESH (5)
- ARUNACHAL PRADESH (7)
- ASSAM (5)
- BIHAR (5)
- DELHI (1)
- GOA (1)
- GUJARAT (2)
- HARYANA (5)
- HIMACHAL PRADESH (2)
- JAMMU & KASHMIR (8)
- MADHYA PRADESH (24)
- KARNATAKA (2)
- JARKHAND (2)
Pancheshwar Multipurpose Project & Poornagiri Re-regulating Project (Indo-Nepal)

Under the Indo-Nepal bilateral co-operation, the scope of the Pancheshwar multipurpose project is being actively discussed and defined to enable finalisation of the Detailed Project Report. The treaty between His Majesty’s Government of Nepal and Government of India as signed in 1996 lays down the framework for integrated development of the Mahakali river including the Pancheshwar Project, Sarda Barrage Project and the Tanakpur Barrage Project. Several meetings of the Joint Group of Experts have taken place afterwards. A Joint Project Office has been established for this purpose in Nepal. For the preparation of the joint Detailed Project Report (DPR), the design of the rock-fill dam & appurtenant works and power facility has been completed, and relevant drawings and design chapters have been issued. The layout for dam and appurtenant works along with power facilities has been evolved for the Poornagiri project to finalise field investigations such as Topographical Survey, Geological Investigations, Construction Material survey, Foundation Investigation etc.

Tala HE Project, Bhutan

The project envisages construction of a 91.00 m high and 130.00 m long diversion dam across river Wangchu near Honka 3 km downstream of the existing Chukha H.E. Project to divert 142.5 cumecs of water into 22.40 km long head race tunnel to generate 1020 MW (6 x 170 MW) power under a design head of 820.00 m. CWC has been appointed as the design consultant for specification / construction stage works. Specification stage designs have been carried out and drawings have been issued to project authorities for preparation of tender documents. The award of work has already been made for 5 contract packages. Currently, detailed design and preparation of construction drawings are being dealt in the D&R wing.

Water Resources Development Projects in the North Eastern Region

CWC is very actively associated with the investigation, planning and design of various water resources development schemes in north eastern region of the country.

At present, there are 15 projects at construction stage for which design consultancy is being provided by the D&R wing of the CWC. In addition, there are about 15 projects for which the Detailed Project Report (DPR) is under preparation. Detailed hydrological studies and design works in respect of these projects are in progress in the D&R wing. The list of the projects is as follows:

A. Arunachal Pradesh
1. Deopani Multi Purpose Project
2. Kundil Irrigation Project
3. Lohit M.P. Project
4. Nuranang chu / Tawang chu HE Project
5. Nyukcharong Project
6. Ranganadi HE project (Construction Stage)
7. Sissiri M.P. Project  
B. Assam  
8. Harang Sub-basin Drainage Scheme (Construction Stage)  
9. Karbi Langpi HE Project (Construction Stage)  
10. Kopili Project  
11. Pagladia Irrigation Project (Construction Stage)  
12. Subansiri Lower H.E. Project (Construction Stage)  
C. Manipur  
13. Dolaitthabi Barrage (Construction Stage)  
14. Jiri Irrigation Project (Construction Stage)  
15. Khuga Multipurpose Project (Construction Stage)  
16. Thoubal Multipurpose Project (Construction Stage)  
D. Meghalaya  
17. Greater Shillong Water Supply Scheme. (Construction Stage)  
18. Jadukata HE Project  
19. Kulsi HE Project  
20. Myntdu HE Project (Construction Stage)  
21. Rongai Irrigation Project (Construction Stage)  
E. Mizoram  
22. Kolodyne HE Project  
23. Tuirini HE Project  
24. Tuivawl HE Project  
F. Nagaland  
25. Doyang HE Project (Construction Stage)  
26. Dikku HE Project  
27. T’Surang Project  
G. Sikkim  
28. Teesta HE Project Stage II  
H. Tripura  
29. Kalasi Barrage (Construction Stage)  

HYDROLOGICAL STUDIES  
The Hydrological Studies Organisation (HSO) is headed by a Chief Engineer. Hydrological studies are, in general, carried out to estimate the design flood, water availability, sediment inflow etc. for the projects under investigation.
and planning. During technical appraisal of the project reports, the hydrological studies are examined and fresh studies are taken up wherever necessary for assessing the technical feasibility of the project. CWC also provides technical consultancy services to various State Government in carrying out hydrological studies in addition to special studies on estimation of yield series and design flood etc.

**Regional Flood Estimation Studies**

The Flood Estimation Report for Upper Narmada and Tapi Basin sub-zone 3(c) has been completed and is under publication.

**REVIEW AND PLANNING OF SAFETY ASPECTS OF DAMS**

Chief Engineer, Dam Safety Organisation (DSO) is looking after all works related to this aspect and is dealing with :

- Instrumentation related to Dams and Power House Caverns besides other hydraulic structures
- Special Analysis like Dam Break Modelling and foundation problems.
- Computer Aided Design and Analysis.
- Monitoring and Rehabilitation of Large dams.

**Dam Safety and Rehabilitation in India (A New Scheme in the Xth Five Year Plan)**

A new Plan scheme titled “Dam Safety and Rehabilitation in India” is under finalisation in the DSO, CWC. The scheme is being prepared keeping in view the suggestions made by the Secretary, Ministry of Water Resources during the meeting held with Heads of Organisation on 6.2.2001. An approach paper was prepared and submitted for concurrence of the Ministry of Water Resources (MOWR) and Planning Commission. The objectives of this scheme are

- to strengthen and consolidate the institutional framework of Dam Safety Assurance in CWC and the participating States; and
- to upgrade the physical features in and around selected dams to enhance their safety status as required through remedial works, basic facilities improvements and additions.

The proposed participants of the project will be the CWC and 12 States, namely Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

**Dam Safety Assurance and Rehabilitation Project [DSARP] – Phase II**

After seeing the performance and benefits obtained from the Dam Safety Assurance and Rehabilitation Project assisted by the World Bank (Credit 2241-IN) it was proposed to extend dam safety activities to the other States owning significant number of large dams. Based on the details received from the new participating States of Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Maharashtra and
Uttar Pradesh and also considering the carry over works on some dams in the States of Madhya Pradesh, Orissa, Rajasthan and Tamil Nadu, the DSARP Ph II has been prepared for an estimated cost of Rs.900.17 crore, which also includes a CWC component of Rs.28.30 crore, during February, 2000. The Government of India forwarded the proposal to the World Bank for obtaining external assistance through Department of Economic Affairs (DEA). However, the World Bank team, after review of the proposal suggested, some analytical works and postponed any further work on a possible Dam safety-II. Thereafter, a meeting was held in the MOWR and some suggestions were made, particularly regarding inclusion of a Disaster Management Programme and Instrumentation in DSARP Phase-II. On the basis of suggestions made in the meeting, DSARP Phase-II proposal (February, 2000) has been modified for an estimated cost of Rs.917.17 crore and submitted to the MOWR. The proposal has already been sent to the DEA for consideration.

**Restoring of FRL (Full Reservoir Level) of the Mulla Periyar dam i.e. upto 152 ft.**

In pursuance of the observations of the Hon’ble Supreme Court on the two transfer petitions by the State of Tamil Nadu and Sri Subramanian Swamy, the Hon’ble Minister for Water Resources constituted an expert committee headed by Member (D&R), CWC to advise him on the safety of the dam as a result of execution of strengthening measures carried out by Government of Tamil Nadu on the advice of CWC and regarding raising of water level in the reservoir beyond 136 ft. (41.45 m).

The Action Taken Report, Interim Report, Final Report and responses of CWC to the reports of the committee have been filed from time to time in the Hon’ble Supreme Court as per the directions of the Hon’ble Court.

**National Committee on Dam Safety (NCDS)**

The National Committee on Dam Safety (NCDS) was constituted by the Government of India in October 1987 by broadbasing the then existing Standing Committee to include all States having significant number of large dams. The National Committee was reconstituted three times i.e. first in December, 1989, again in July, 1993 and in November, 1997 to include States/ agencies having significant number of dams. This Committee oversees dam safety activities in various States/Organisations and suggests improvements to bring these in line with the latest state-of-art level of dam safety consistent with the Indian conditions. It acts as a forum for exchange of views on techniques adopted for remedial measures to old dams in distress. The Committee also monitors follow-up-action on recommendations of the report on Dam Safety Procedure circulated in July, 1986.

The 22nd meeting of NCDS was held on 18 April, 2001 in the Central Water Commission, New Delhi under the chairmanship of Dr. B.K.Mittal, Chairman, CWC and Chairman, NCDS. Major dam safety issues were discussed during the meeting. Confirmation of the minutes of 21st meeting of NCDS, position of proposed DSARP Phase-II, review
of National scenario, progress of implementation of the recommendation of “Report on Dam Safety Procedure”, Dam Safety Legislation, preparation of emergency action plans and inundation maps for down stream area, compilation of data book, preparation of completion report of large dams, preparation of operation and maintenance manual, periodical inspection of dams and report on dam safety activities in the States, safety review of large dams (once in ten years), monitoring safety report of inter-state dams by the sub-committee of the NCDS, setting up of hydrological units in the States for review of hydrology of existing dams, instrumentation for dams, seismic studies of dams, need for research and development of dam safety, National Register of Large Dams, National performance of dams programme and dams under State Electricity Boards were the topics deliberated upon during the meeting.

National Committee on Seismic Design Parameters (NCSDP)

The 11th meeting of the National Committee on Seismic Design Parameters (NCSDP) was held on 7 June, 2001 at New Delhi under the Chairmanship of Member (D&R) and seven projects were discussed. Seismic coefficient for one project was finalised.

Dam Break Studies and Back Water Studies

During the year 2001-2002, studies of the following projects were carried out :-

Dam Break Studies

i) Sukhi Irrigation Project, Gujarat

ii) Almatti and Narayanpur dams, Karnataka

Dam Break Studies on consultancy basis for the Rami Irrigation Project, Gujarat are under progress.

Training Programmes

The Design & Research (D&R) wing of Central Water Commission (CWC) organised the following training programmes during the year:-

<table>
<thead>
<tr>
<th>Training Course</th>
<th>Duration</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training Course on “Dam Break analysis”</td>
<td>24.9.2001 to 28.9.2001</td>
<td>New Delhi</td>
</tr>
<tr>
<td>Training Course on “Geological Investigations and Foundation Treatment for River Valley Projects”</td>
<td>15.10.2001 to 19.10.2001</td>
<td>New Delhi</td>
</tr>
<tr>
<td>Workshop on “Estimation of Design Flood for Small and Medium Catchment”</td>
<td>6.11.2001 to 8.11.2001</td>
<td>New Delhi</td>
</tr>
</tbody>
</table>
River Management Wing

Collection of Hydrological, Hydrometeorological, Silt and Water Quality data in all the major river basins of India and formulation and issue of stage forecast and inflow forecast in all the interstate river basins and selected reservoir respectively is part of main activities of River Management (RM) Wing of CWC. Its other activities include technical matters concerning river morphology, flood management schemes, investigation and appraisal of medium projects/schemes and monitoring of implementation of Command Area Development and Accelerated Irrigation Benefits programmes.

Hydrological Data Collection

The Central Water Commission at present operates the National Network of about 953 Hydrological Observation stations. The basic data collected by field units is processed and validated at Sub Divisions, Divisions and Circle Level and authenticated data in the form of Water Year Book, Sediment Year Book and Water Quality Year Book is then transmitted to CWC (HQ) for storage, updating, retrieval etc. The dissemination of data to bonafide users is done as per the data request received in regional offices of CWC as well as at Head Quarter by Planning & Development Organisation and Information System Organisaton (ISO) of CWC.

The P&D Unit of the CWC is maintaining the Hydrological data pertaining to Ganga, Brahmaputra and Barak Basins in a computerised format. The data of these basins being of classified nature, is provided to bonafide users on request following a set procedures and guidelines for release of classified data. Wherever required, the approval of Ministry of Water Resources (Eastern Rivers Wing) is sought for release of such data.

The users of the data have been categorised in three different categories:-

2. Public Sector Undertaking and institutions/societies working under the direct control of Central/State Government and IITs
3. Research institutions/Scholars both Indian and Foreign.

Water Quality Monitoring

The Central Water Commission is monitoring water quality at 369 key locations covering all the major river basins of India. The CWC has a three tier laboratory system for analysis of the parameters. The Level-I laboratories are located at 258 field water quality monitoring stations on major rivers of India where physical parameters such as Temperature, Colour, Odour, Specific Conductivity, Total Dissolved Solids, pH and Dissolved Oxygen of river water are observed. There are 23 Level-II laboratories located at selected Divisional headquarters to analyse 25 nos. physico-chemical characteristics and bacteriological parameters of river water, 4 Level-III/II +
Laboratories are functioning at Varanasi, Delhi, Hyderabad and Coimbatore where 41 parameters including Heavy Elements/Toxic parameters and Pesticides are analysed. The data generated is computerised in Data Base System and disseminated in the form of Hydrological Year Book, Status Reports and Bulletins. Water Quality Year Books are published and Water Quality Bulletins are issued regularly by the field offices.

Under the Hydrology Project 70 water quality Level-I Laboratories, 8 Level-II laboratories have been upgraded, in addition to the establishment of two new water quality level-II laboratories and two Level-II+ Laboratories. Level-I laboratories are upgraded by providing quartz distillation plant, portable kit, pH meter, conductivity meter etc. Level-II laboratories are upgraded by providing Ultra Violet Visible spectrophotometer, Ion meter, Flame photometer, centrifuge, conductivity meter, binocular microscope and in Level-II+ Labs. sophisticated equipment like Atomic Absorption Spectrophotometer Ion meter, Gas Chromatography, Top loaded electronic balance and microwave Digester have been provided. The existing staff have been given the training for analysis of pollution related parameters, operationalisation of instruments, analytical quality control (AQC) and HYMOS based surface water quality data entry system.

The level-II+ Laboratory at Hyderabad has also been entrusted with the work of the Analytical Quality Control programme (AQC) for all the surface water level-II and Level-II+ Water Quality Laboratories, which include A.P. (2), Gujarat (2), Karnataka (2), Kerala (1), Maharashtra (4) and CWC’s own regional laboratories (12).

The Ministry of Environment and Forests has laid emphasis on water quality monitoring in an integrated manner by constituting the Water Quality Assessment Authority (WQAA) at the national level under the provisions of Environmental Protection Act, through an extraordinary notification in the Gazette of India dated 22nd June, 2001, for a co-ordinated effort in maintaining the quality of work of national water resources. The Central Water Commission will have a major role in the work of the Water Quality Assessment Authority.

**Flood Management**

Due to techno-economic constraints, it is not possible to provide complete protection from floods. However, an area of about 15.81 m.ha. (upto March, 2000) has been provided with a reasonable degree of flood protection through various structural flood management works. The Rashtriya Barh Ayog (RBA) assessed an area of about 40 m.ha. which is prone to floods in the country, out of which 32 m.ha. can be provided with protection. To protect the remaining area from flood, importance is given to non-structural measures such as Flood Plain Zoning, Flood Proofing and Flood Forecasting Techniques, etc.

**Flood Plain Zoning**

Keeping in view the need for adopting non-structural measures like regulation of economic and human activities in the flood plains, a
model bill was circulated in 1975 to all the States for its enactment. So far, only the Governments of Manipur and Rajasthan have enacted a legislation for flood plain zoning.

**Flood Forecasting**

Flood forecasting activities in India in a scientific manner made a beginning in 1958 when the erstwhile Central Water and Power Commission (C.W. & P.C.) set up a Flood Forecasting Unit (FFU) for issuing flood forecasts and warnings of incoming floods in the Yamuna at the National Capital, Delhi. This service has since been expanded by CWC to cover almost all major flood prone inter-state river basins of India. At present, there are 159 flood forecasting stations spread over throughout the country, on various inter-state river basins. 134 of these are level forecasting and the remaining 25 inflow forecasting stations on major dams/barrages. The service covers the 8 major river systems in the country, which includes 62 river sub-basins. They pertain to 14 States viz. Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Uttaranchal, Uttar Pradesh and West Bengal and one Union Territory Dadra and Nagar Haveli and the National Capital Territory of Delhi.

On an average over 6,000 forecasts are being issued every year by the Central Water Commission during the flood season. Normally, these forecasts are issued for 12 to 48 hours in advance, depending upon the river terrain, the locations of the flood forecasting sites and base stations. Hydrological data are being observed at more than 700 Gauge and Discharge sites and hydro meteorological data over 500 rain gauge stations and communicated through a network of more than 450 wireless stations. Synoptic weather situations, weather forecast/heavy rainfall warnings etc. are also being collected from Flood Management Organisations.

At the Headquarters of Central Water Commission at New Delhi, the Flood Forecasting Monitoring (FFM) Directorate is compiling daily flood forecasts issued by its field units from all over the country and issuing two daily flood forecast monitoring bulletins, in two parts, Part-I for Level and Part II for inflow forecast stations, respectively, from May to October. In addition to these during the flood season some special flood bulletins are also being issued, when rivers attain levels within 0.50 m. of their previous High Flood Level or exceeded previous High Flood Level at any of the flood forecasting stations.

**Flood Situation in 2001-2002**

The country as a whole received normal rainfall during the year 2001-2002. However, there were floods of varying magnitude due to heavy rains in Andhra Pradesh, Assam, Bihar, Chhattisgarh, National Capital Territory of Delhi, Orissa, Uttar Pradesh and West Bengal. Out of these, the State of Orissa experienced severe floods. In Assam, Bihar, Himachal Pradesh, Punjab, Orissa, Rajasthan and Uttar Pradesh, an area of about 2.13 m.ha. was affected by the floods during the monsoon period, affecting a population of
about 19.00 millions in these States. Crop in an area of about 1.46 m.ha. were also reported to have been damaged.

Co-operation between India and Nepal

There is considerable scope for co-operation between India and Nepal in the field of water resources particularly in the field of flood forecasting, and hydropower development by utilising the abundant potential of northern tributaries of the Ganges flowing from Nepal to India.

As per agreement “Both India and Nepal agreed to expedite the implementation of the facilities to be provided for an efficient flood forecasting system”. As agreed, Nepal will implement and maintain the system in its territory. However, at the suggestion of India to implement the scheme expeditiously, it was agreed that Nepal will supply data on real time basis for flood forecasting for the period from June to October. India will provide similar data on two points downstream of the border of the same river on reciprocal basis.

Under the scheme Flood Forecasting and Warning system on river common to India and Nepal, 42 Hydrometeorological stations are proposed to be established. Out of these, 37 stations have been commissioned till now. The remaining 5 stations are proposed to be commissioned during the remaining period of IX Five Year Plan. Rainfall data and river gauge data of 27 stations in the upper catchment in Nepal were received during the flood season of 2001 by Middle Ganga Division IV, Central Water Commission, Patna. The gauge data of 10 sites in Indian territory is being transmitted to Nepal during the flood season. Permanent wireless masts have been created at 41 sites. A proposal for Rs. 183.00 lakhs for continuation of the scheme during the IX plan has been sanctioned by Ministry of Water Resources and the work is in progress. At the joint Technical level meeting between India and Nepal both sides agreed to operationalise all the remaining sites at the earliest. A Committee on flood forecasting has also been set up to review/modernise the existing flood forecasting scheme. The first meeting of the Committee was held at New Delhi on 26-27 April, 2001.

Co-operation between India and Bangladesh

Under Indo-Bangladesh Co-operation, on flood forecasting, a direct wireless link has been established at four sites in India and Bangladesh for conveying water levels to Bangladesh and flood data of eleven sites are passed on to Bangladesh every day. As per the agreement during Indo-Bangladesh Experts level meeting on flood forecasting and warning held at New Delhi from 24th to 28th August, 2000, point to point communication of data of rivers Dharla/Jaldhaka and Dudh Kumar/Torsa between NH-31 and Kurigram and Ghugurmari, respectively commenced during 2001.

As per the treaty signed in December, 1996 between the two countries on sharing of the Ganges waters at Farakka, joint monitoring of flow was restarted from January, 1997 at
Farakka in India and at Hardinge Bridge in Bangladesh, and continued during the period under report.

A Joint Scientific Study Team (JSST) was constituted to study the discrepancies in the discharges released at Farakka in India and Hardinge Bridge in Bangladesh. Member (River Management), Central Water Commission is the Chairman from the Indian side and Chairman, Bangladesh Water Development Board is the Chairman from the Bangladesh side of the JSST. The 3rd Indo-Bangladesh JSST meeting was held at New Delhi from 20th-22nd December, 1999. Exchange of data between India and Bangladesh as agreed upon is being communicated on reciprocal basis.

The Chairman, CWC attended Joint Rivers Commission meeting at Dhaka from 11-14 January, 2001 and the flood forecasting arrangements between India & Bangladesh and issues related to Joint Scientific Study were discussed in the meeting.

**Indo Bhutan Co-operation**

With the co-operation of Government of India, a Hydrometeorological network of 29 sites are established in Bhutan. The sites are maintained by the Hydromet Division of the Government of Bhutan on rivers common to India and Bhutan. Of this, at 9 sites, gauge – discharge observations are made and at 6 sites sediment observations are also made. Eleven sites are equipped with wireless sets. The data disseminated from these sites is being used for issue of flood forecasts for the stations located in India on these rivers.

The Standing Finance Committee memo for Rs. 133.20 lakhs for continuation of the scheme during IX Plan has been sanctioned by the Ministry of Water Resources and the work is in progress.

**Indo-China Co-operation**

In light of flash floods in the Brahmaputra and Satluj due to heavy rain in Tibet (China) during the monsoon of 2001, a draft proposal for formulation of a flood forecasting and warning system between India and China for the rivers that flow from Tibet to India was submitted to the Ministry of Water Resources, and Commissioner (Eastern Rivers), MoWR attended the meeting at Beijing (China) from 7th to 9th June, 2001.

**Modernisation of Flood Forecasting Services**

The CWC is making constant endeavour for updating and modernising the forecasting services with an aim to improve the accuracy of the forecasts and increase the warning time, to make them more effective. Flood Forecasting techniques are being constantly reviewed and upgraded. Forecasting involves a number of stages, namely, data observation, collection, transmission, compilation and analysis, formulation of forecasts and their dissemination. To make the forecast more accurate, effective and timely, each stage is being improved/ modernised. The use of computerised models and Mike-11 etc. for forecast formulation has been widely introduced.
River Morphological Studies

The report on Morphological studies of the Narmada Basin is under preparation and is likely to be completed by March, 2002. Data for Morphological studies of the Tapi Basin is being tabulated. Volume IX of the Atlas covering the reach from Hardwar to Kanpur and Volume X of the Atlas for the reach Farakka to Haldia of the Ganga river are under progress.

COASTAL PROTECTION WORKS

National Coastal Protection Project (NCPP)

With the discontinuation of Central Loan Assistance, the State Governments/Union Territories have been facing financial difficulties in funding the anti-sea erosion works. Beach protection works suffered serious setbacks due to paucity of funds with State Governments. The State Governments approached the Government of India for locating sources of funding for anti-sea erosion works. Realising the set back received in the progress of coastal protection works in the maritime States, the Beach Erosion Board (now renamed as Coastal Protection and Development Advisory Committee), in its 23rd meeting held in July, 1994, requested the maritime States to formulate proposals for protection of vulnerable coastal reaches from sea erosion in their respective States and send the proposals to the Central Water Commission, which will co-ordinate and prepare a consolidated National Coastal Protection Project (NCPP) based on proposals received from State Governments for posing for its external assistance.

Accordingly, the State Governments of Andhra Pradesh, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Orissa, Tamil Nadu and West Bengal submitted their proposals for inclusion in the NCPP. These proposals were examined and compiled in Central Water Commission and a consolidated National Coastal Protection Project (NCPP) estimated to cost Rs. 1275.74 crores was prepared and submitted to the Ministry of Water Resources in February, 1999 for identifying the Funding Agency.

The Ministry of Water Resources has advised to forward the NCPP along with necessary Technical Advisory Committee (TAC)/Investment clearance.

Meanwhile, the NCPP proposal, costing Rs. 1275.74 crores was modified to Rs. 1323.83 crores after incorporating the revised proposal of Goa and Gujarat.

As a part of the process of obtaining TAC/Investment clearance for the NCPP, copies of the consolidated National Coastal Protection Project were sent to various Departments such as the Central Water & Power Research Station, Planning Commission, Ministry of Environment and Forests, Ministry of Surface Transport, National Institute of Oceanography, Chief Engineer (Project Appraisal), CWC and Director, Cost Appraisal (Irrigation), CWC, for their comments.
The comments received from the various Departments were sent to State Governments in August, 1999, to recast their proposals in the light of the observations offered by various aforesaid agencies. The recast proposals received from State Governments from time to time were examined and comments sent to the State authorities for further modifications.

At present, the proposals of maritime States/UTs are in various stages of finalisation for inclusion in the NCPP. Total estimated cost of the modified consolidated NCPP is expected to be around Rs. 1800.00 crores covering coastal States, namely, Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Orissa, West Bengal and UT of Pondicherry. NCPP proposals from UT of Lakshadweep and Andaman and Nicobar Islands are yet to be received.

The project is proposed to be completed within a period of five years.

Survey and Investigation

The River Management Wing of the CWC has been carrying out detailed survey and investigation, including preparation of feasibility reports for development of water resources projects, in Sikkim, North Eastern States and neighbouring countries of Nepal & Bhutan.

Projects in Sikkim

The work of investigation of a hydro-electric project in the Teesta Basin in Sikkim for the cascade development was taken up by the Central Water Commission in 1974. Survey and Investigation in respect of Stage III, IV, V and VI of Teesta Hydro Electric (H.E.) Project has been completed and detailed project reports have been submitted to the concerned authorities. Survey and Investigation work for Teesta H.E. Project Stage II, which was taken up in 1998, is in progress. Stage II envisages the construction of two separate dams on river Lachenchu and Lachungchu, tentatively near the village Chatten and village Lema, respectively. One head reach tunnel of appropriate diameter about 12.00 km long from the Lachen side and another about 9.00 km long from the Lachung side will divert waters of the Lachenchu/ Lachungchu to a common balancing reservoir. The power house will be located near Chungthang, working under a head of about 720.0 m. The project is at an advanced stage of investigation and 74.30% progress has already been achieved upto October, 2001. The Detailed Project Report (DPR) of this project is scheduled to be submitted by March, 2002.

Projects in North-Eastern States

The Central Water Commission has been carrying out detailed surveys and investigation and preparation of detailed project report of water resources development projects in the North Eastern States. These projects are being investigated as deposit works from the North-Eastern Council, State Governments and as Plan Schemes of Government of India. At present, 11 projects are at various stages of investigation in the North-Eastern States.
PROJECTS IN NEIGHBOURING COUNTRIES

Pancheshwar Multipurpose Project

A 295.00 m. high dam is proposed to be built on the Mahakali river (known as Sarda in India) forming the international border between India and Nepal. The project is planned as a peaking station with installed capacity of 5600 MW at Pancheshwar, and with a downstream re-regulating dam either at Rupaligad and Purnagiri. A Joint Project Office-Pancheshwar Investigation (JPO-PI) has already been opened at Kathmandu w.e.f. 10.12.1999 and field investigations and preparation of DPR is being carried out by it. The Chief Engineer, Yamuna Basin Organisation (YBO) functions as Member-Secretary of the Joint Group of Experts (JGE), the main decision making body for the project. All the administrative technical and financial matters of this project are being co-ordinated by the Yamuna Basin Organisation. The 17th meeting of the JGE was held at Kathmandu on November 21-23, 2001, wherein the progress of various field investigations and studies was reviewed. In view of the delays due to various hindrances and possibility of non-completion of the DPR by December, 2001, the time schedule for functioning of the JPO-PI has been recommended to be extended upto June, 2002 for taking further action by the Government of India and His Majesty’s Government of Nepal.

In the 4th meeting of the Joint Team of Experts (JTE) held at Kathmandu from 11th to 14th October 2001, the revised Inception Report for studies/investigations was disscussed. All the unresolved issues on the Inception Report were resolved and the report was finalised and signed. It is proposed to open a Joint Project Office and other field offices for the project at the earliest.

Sankosh Multipurpose Project (Bhutan)

Co-operation with Royal Government of Bhutan was continued in respect of the works for hydro power developments and establishment of Hydrometeorological and flood forecasting networks on rivers common to India and Bhutan.

Survey and investigation works for preparation of the detailed project reports for the Sankosh Multipurpose Project was taken up, the following the signing of a Memorandum of understanding in January, 1993 between India and Bhutan, in Bhutan as well as in Indian territory, at a cost of Rs. 6.39 crores and Rs. 2.58 crores, respectively. The

Sapta Kosi High Dam Multipurpose Project

The Kosi river (called the Saptakosi in Nepal) rises at an altitude of 7000 m. in the Himalayas and drains an area of 59,539 sq. km. in mountains before entering into Tarai region of Nepal. It provides an ideal site for a high dam Project. A 269 m. high straight gravity concrete dam is proposed to be constructed on the river, about 1.60 km upstream of Barahakshetra, in Nepal territory which is around 60.0 km upstream of the existing Kosi barrage constructed at Hanuman Nagar by the Government of India in the year 1959 at the Indo-Nepal border.
Manas Sankosh Teesta Link Canal

Survey and investigation works for Manas Sankosh Teesta Link Canal have been entrusted to Central Water Commission by the Ministry of Water Resources. The scope of work includes a fresh survey in the reach from Manas to Sankosh and amplification of earlier survey conducted for the reach from Sankosh to Teesta under the Sankosh Multipurpose Projects, besides Geological/Geo-technical/Soil/construction material survey for both the reaches.

Topographical survey for a length of 104.11 km out of a total length of 141.70 km of canal alignment longitudinal section for a reach of 5.00 km (3 km upstream 2 km downstream of the barrage axis) along with contour plan covering the area 100 m away from each bank of the river in respect of the Torsa barrage have been completed, and L-section for a reach of 6.20 km along with contour plan of each bank of the river is respect of the Jaldhaka barrage have also been completed. Property survey along the canal alignment for a length of 104.00 km has also been completed. The survey work for the reach from Manas to Sankosh, called as Reach-I (114.00 km long) which passes through Manas Tiger Reserve could not so far be taken up in the absence of clearance from the forest authorities. The matter was taken up with Ministry of Water Resources. An alternative alignment for transfer of water of the Brahmaputra to the Ganga en route Teesta was conducted jointly by the Central Water Commission and National Water Development Agency in November, 1999 and the report on this was submitted to Commissioner (Eastern Rivers), Ministry of Water Resources in April, 2000. The approval for implementation of the Manas Sankosh-Ganga link is awaited from MoWR. As discussed in the third meeting of Coordination Committee held on 29.08.2001, approval/decision for conducting aerial topographical survey of Manas Teesta Link to NRSA, Hyderabad is also under process.

Kirthai Project

The field investigations for the first stage of the Kirthai Hydro Electric Project has been completed. Electrical and Mechanical designs of various project components are being finalised by a specialised Directorate of the Central Water Commission and the Central Electricity Authority (Headquarters). The Detailed Project Report is under preparation and likely to be submitted by the end of this financial year.

Investigations at Kirthai Hydro Electric Project (Stage-II) are under progress. A total of 257.50 m. drilling has been completed. Unfortunately, work has had to be suspended.
temporarily due to deterioration in law and order condition in the project area.

**Monitoring of Command Area Development Project**

Field units of the River Management Wing of the CWC at present are entrusted with monitoring work of 60 Command Area Development (CAD) projects being implemented in various States throughout the country. Out of 60 projects allotted to CWC, monitoring of 47 projects has already been started by the field units of the CWC. So far 105 quarterly status reports received from field units have been examined in the River Management (R.M.) Wing.

**Activities related to INCID**

The Indian National Committee on Irrigation & Drainage (INCID) Sub-Committee-III on Flood Management Drainage and Environmental Impacts, with Member (RM), CWC as its Chairman, for selection and monitoring of Research & Development schemes in the field of “Flood Management, Drainage and Environmental Impacts”, convened its fourth meeting on 03.09.2001, to examine various Research & Development proposals for funding by Ministry of Water Resources, and to review the progress of schemes already sanctioned. Out of the 10 ongoing R&D schemes final reports in respect of 3 schemes were considered for acceptance in the meeting. It was observed in the meeting that the progress of two schemes was not satisfactory due to non-seriousness of the Principal Investigator (P.I.) and therefore decided to take action against the P.I.

**Hydrology Project**

The Hydrology Project has been under implementation since 22 September, 1995 for a period of six years with aid of US $ 142.00 million under a Credit Agreement with the Government of India. The Government of India component in the Project is US $ 21.50 million. The project completion date has been extended by one year i.e. upto March, 2003.

The Hydrology Project aims at establishing a sustainable Hydrological Information System (HIS) for the Central and the State agencies participating in the project. A Hydrological Information system comprises the physical infrastructure and human resources to collect, process, store and disseminate data on hydrological, geo-hydrological and hydro-meteorological quantity and quality variables. The Hydrology Project covers the entire Peninsular region of India, and in the CWC its activities extend to 5 Regional offices and at Central Water Commission Headquarters at New Delhi.

The primary role of the Hydrological Information System (HIS) is to provide reliable data sets for long term planning, design and management of water resource and water use systems and for research activities in related aspects. It is also envisaged that the system will function in such a manner that it provides information to users in time and in proper form. The scope of HIS does not extend to provide data to users on a real time basis for short term forecasting.
In the Central Water Commission, surface water observation networks (284 nos.), Water Quality Laboratories (10 Level II and 2 Level II+ in addition to existing Level I laboratories), Sub Divisional Data Processing Centres (SDDPC) one in each sub-division, Divisional Data Processing Centres (DDPC) one in each division, for each region a Data Processing and Data Storage Centre (RDPC and RDSC) and at the national level a National Data Centre (NDC) are proposed. Extensive institutional strengthening is proposed to be done by training personnel at various levels, right from observations to data analysis and storage.

WATER PLANNING AND PROJECT WING

This Wing is responsible for overall planning and development of basin-wise perspective plans for development and management of surface water, the national perspective plan for the development of water resources in accordance with the National Water Policy, techno-economic appraisal of water resources projects, assistance to States in the formulation and implementation of projects, monitoring of selected projects for identification of bottlenecks to achieve targeted benefits, preparation of projects for international assistance, environmental aspects, allocation of water of interstate basins, construction machinery planning, performance evaluation of irrigation projects and application of remote sensing techniques in water resources development and management.

Project Appraisal

One of the important activities assigned to the CWC is techno-economic appraisal of irrigation, flood control and multipurpose projects proposed by State Governments. After the establishment of techno-economic feasibility of a project, the Advisory Committee on Irrigation, Flood Control and Multipurpose Projects headed by Secretary, Ministry of Water Resources, considers projects for acceptance, and thereafter recommends the projects for investment clearance by the Planning Commission. Besides, power projects proposed by State Electricity Boards/Private Sector Organisations are scrutinised in the Central Water Commission from hydrology, civil design, inter-state and cost angles in the case of hydro projects, and for establishing water availability for cooling and other purposes in case of thermal projects. Technical aspects of water supply schemes are also appraised when referred by the State Governments.

A similar function is discharged by the Project Preparation Organisation (PPO) under a Chief Engineer in respect of Major, Medium Irrigation and Water Resources Consolidation Projects, that are posed for external assistance.

APPRAISAL OF MAJOR IRRIGATION PROJECTS

Major Irrigation Projects {CCA (Culturable Command Area) above 10,000 hectares} are examined for various aspects in specialised Directorates in the CWC and in the Ministries of Water Resources,
Agriculture, Environment & Forests and Social Justice & Empowerment. In case of multipurpose projects, examination in the Central Electricity Authority is also done for the power components. The appraisal procedure has been revised and simplified. Now the Preliminary Report, prepared in brief, covering basic planning aspects is examined first and ‘In Principle’ consent of the Central Water Commission for Detailed Project Report (DPR) preparation is communicated on the basis of soundness of proposals. Clearances for Environment, Resettlement & Rehabilitation (R&R) plans and concurrence of State Finance etc. is obtained and submitted along with the DPR so that once cleared by the Advisory Committee, the investment clearance of the Planning Commission can follow soon and the project can be started without waiting for different clearances from different sources. The revised procedure is applicable w.e.f. October, 2001. During the year 2001-2002, 31 New Major and 27 Revised Major Irrigation Projects were under appraisal in the Project Appraisal Organisation. A Pie Chart showing state-wise distribution of new major irrigation projects is shown in Figure 3.

**APPRAISAL OF MEDIUM IRRIGATION PROJECTS**

For Medium Irrigation Projects (Culturable Command Area 2,000 to 10,000 hectare), State Governments are required to prepare detailed project reports as per existing guidelines after adequate investigation/surveys and collecting requisite data. During the year 2000-2001, 46 New Medium and 25 Revised Medium Irrigation Projects were under appraisal in various Regional Offices of Central Water Commission for which necessary assistance was provided by the Central Water Commission. However, for appraisal, projects are put up by the Project Appraisal Organisation to the Advisory Committee for consideration and acceptance. Pie Chart showing the State wise distribution of new medium irrigation projects is shown in Figure 4.

**MEETING OF THE ADVISORY COMMITTEE**

In November 1987, the Ministry of Water Resources reconstituted the Advisory Committee for Irrigation, Multipurpose and Flood Control Projects with Secretary, Ministry of Water Resources as Chairman and Chief Engineer (Project Appraisal Organisation), Central Water Commission as Member Secretary. The Committee is entrusted with the function of examining proposals scrutinised in the Central Water Commission and conveying the decision on the techno-economic viability of the projects. During the year 2001-2002, the Advisory Committee met on 3.8.2001 and 24.9.2001 under the Chairmanship of Secretary, Ministry of Water Resources and considered 9 projects, out of which 1 major project (Bhopal Pump Canal, Uttar Pradesh) was deferred and 8 projects were accepted, comprising 1 multipurpose, 3 major, 2 medium irrigation and 2 flood control projects.
Figure 3

STATE WISE DISTRIBUTION OF NEW MAJOR IRRIGATION PROJECTS (AS ON 31.10.2001)- TOTAL PROJECTS-31

- Andhra Pradesh (2)
- Jharkhand (2)
- West Bengal (1)
- Bihar (2)
- Karnataka (3)
- Uttaranchal (1)
- Madhya Pradesh (2)
- Maharashtra (4)
- Orissa (3)
- Punjab (3)
- Rajasthan (3)
- Tamilnadu (1)
- Uttar Pradesh (4)
Figure 4

STATE WISE DISTRIBUTION OF NEW MEDIUM PROJECTS (AS ON 31.10.2001)- TOTAL PROJECTS-46
The details of the projects are as under:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the State</th>
<th>Name of the Project</th>
<th>Estimated Cost (Rs. in crores)</th>
<th>Annual irrigation in Hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Jammu &amp; Kashmir</td>
<td>Modernisation of New Pratap Canal (New Medium)</td>
<td>21.68</td>
<td>12,042</td>
</tr>
<tr>
<td>2.</td>
<td>Punjab</td>
<td>Ranjit Sagar Dam Project (Thein Dam) with Shahpur Kandi Dam Project-UBDC Hydel Project, Stage II</td>
<td>5065.48</td>
<td>34,8173</td>
</tr>
<tr>
<td>3.</td>
<td>Punjab</td>
<td>Lining of Channel – ERM (New Medium)</td>
<td>49.02</td>
<td>8,330</td>
</tr>
<tr>
<td>4.</td>
<td>Bihar</td>
<td>Pun Pun Barrage (New – Major)</td>
<td>102.26</td>
<td>13,898</td>
</tr>
<tr>
<td>5.</td>
<td>Rajasthan</td>
<td>Sidhmukh Irrigation Project (Revised Major)</td>
<td>220.86</td>
<td>4,3214</td>
</tr>
<tr>
<td>6.</td>
<td>Uttar Pradesh</td>
<td>Extension of Gomtinagar Protection Bundha (New Major)</td>
<td>9.96</td>
<td>—</td>
</tr>
<tr>
<td>7.</td>
<td>West Bengal</td>
<td>Protection to the Right Bank of River Ganga/Padma</td>
<td>29.4072</td>
<td>—</td>
</tr>
<tr>
<td>8.</td>
<td>Uttar Pradesh</td>
<td>Uttar Pradesh Water Sector Restructuring Project – Phase – I (New Major)</td>
<td>663.41</td>
<td>4,43,900</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>6162.07</strong></td>
<td><strong>8,69,557</strong></td>
</tr>
</tbody>
</table>

Out of these 8 accepted projects by the Advisory Committee, 6 irrigation projects will provide additional annual irrigation benefits of 86,9557 hectare, in the States of Bihar, Jammu & Kashmir, West Bengal, Punjab, Rajasthan and Uttar Pradesh. The flood Control Schemes of Uttar Pradesh and West Bengal will provide protection to an area of 758 hectare, thereby saving an average about Rs. 33.08 crores annually. State wise distribution of projects accepted by the TAC during the current year is enclosed as Figure 5.

**Appraisal of Power Projects**

60 Hydroelectric and 27 Thermal Power Projects are also under appraisal. During the year, 1 Hydel Project having total installed capacity of 70.00 MW and 3 Thermal Power Projects having total installed capacity of 2336.62 MW have been cleared by the
Figure 5

STATE WISE DISTRIBUTION OF PROJECTS ACCEPTED BY ADVISORY COMMITTEE OF MOWR (AS ON 31.12.2001)- TOTAL PROJECTS-8
Central Water Commission and finally by the Central Electricity Authority, upto 31.10.2001. More Projects are also likely to be cleared during the remaining period of the year.

**MONITORING OF PROJECTS**

Intensive monitoring of selected ongoing major and medium irrigation projects is being carried out by the Central Water Commission, to monitor the physical and financial progress of the projects, to identify bottlenecks causing delays in completion of projects and to suggest remedial measures for creation of the designed potential, as per the schedule. Annual Reports on the status of monitored projects, highlighting critical issues needing attention are prepared and furnished to the Planning Commission and the concerned State Governments etc. Externally aided/inter-state/centrally sponsored major projects are monitored by the Project Monitoring Organisation (PMO), headed by a Chief Engineer, stationed at the Headquarters, while the regional organisations of the CWC, headed by respective Chief Engineers, take care of monitoring activities of other important major and medium irrigation projects. One hundred and twenty nine (129) major projects (including Extension, Renovation and Modernisation (ERM) projects) and seventy (70) medium projects have been identified for monitoring during 2001-2002. Out of these, eighteen (18) major projects are being monitored by Project Monitoring Organisation at CWC Headquarters.

Since 1996, Central Loan Assistance (CLA) is being provided to selected major and medium irrigation projects in the country under the Accelerated Irrigation Benefits Programme (AIBP). The Central Water Commission has been assigned the responsibility of monitoring the projects receiving CLA. The Field Monitoring Directorates of the Central Water Commission are monitoring the physical and financial progress of AIBP components and sending monitoring reports to the Department of Programme Implementation, Ministry of Water Resources and the Central Water Commission (Headquarters). The CLA instalments to states are released by the Ministry of Water Resources and Ministry of Finance based on recommendations of the Central Water Commission monitoring units. One hundred and twenty three (123) projects selected under this Programme are being monitored by the CWC field monitoring organisations.

The State-wise number of projects being monitored by the CWC are given at Figures 6 to 9.

**NATIONAL ENVIRONMENTAL MONITORING COMMITTEE FOR RIVER VALLEY PROJECTS (NEMCRVP)**

The National Environmental Monitoring Committee for River Valley Projects (NEMCRVP) was constituted in February, 1990 for monitoring the implementation of environmental safeguards of irrigation, multipurpose and flood control projects. The Committee has selected 85 projects for monitoring, out of which 17 are being closely monitored.
Figure 6

MAJOR/ERM PROJECTS MONITORED BY CWC (HQs & FIELD)

TOTAL NUMBER 129
Figure 7

MEDIUM PROJECTS MONITORED BY CWC (FIELD)

TOTAL NUMBER 70
Figure 8

MAJOR ERM PROJECTS MONITORED BY CWC (HQs)

TOTAL NUMBER 18
Figure 9

MAJOR/MEDIUM/ERM PROJECTS UNDER AIBP MONITORED BY CWC (FIELD)

TOTAL NUMBER 123
Out of these 17 projects to be monitored closely, the committee has so far visited 15 projects and 7 of these projects have been visited twice. Besides these, 19 projects out of 85 projects identified for environmental monitoring have also been visited, with one project visited twice. 43 meetings and 45 visits of NEMCRVP has been arranged during the last 11 years.

In order to monitor the progress of other projects, the Committee has advised various State Governments and Project authorities to constitute State Level Environmental Monitoring Committees (SEMC) and Project Level Environmental Management Committees (PEMC). 17 SEMCs and 66 PEMCs have so far been constituted.

The progress achieved by the NEMCRVP is being brought out in the shape of an Annual Report giving details of visits and meetings. Projects visited and directions given to various states/project authorities for implementing the safeguards stipulated at the time of clearance of the projects are highlighted in the Annual Report. The Annual Report of NEMCRVP for the year 1999-2000 has been published and circulated amongst the Central/State authorities. The Annual report for the year 2000-2001 is under preparation.

Ranjit Sagar Dam Project (Punjab) was visited by Director (EM), CWC for review of the status of implementation of the minutes of the earlier NEMCRVP meetings. Efforts were made to activate SEMCs and PEMCs for effective implementation of Environmental safeguards in River Valley Projects.

**ENVIRONMENT IMPACT ASSESSMENT (EIA)**

The Central Water Commission has taken up a few studies on Environment Impact Assessment. A study of the “Tenughat Project” has been completed. The status of progress of studies on Environment Impact Assessment of Water Resources Projects is as follows-

1. Draft report on environmental evaluation study of Mahi Projects (Madhya Pradesh) is at a final stage.

2. For the Expert Committee on River Valley & Hydroelectric Projects of Ministry of Environment & Forests, reports related to Environmental Impact Assessment aspects of 4 projects were examined and comments prepared. Three more meetings of the Expert Committee are likely to be held before March, 2002 in which 4 more projects may be discussed for detailed examination. Revised final draft on Environmental Impact Assessment and Socio-economic study of the Pancheswar Multi purpose project is likely to be examined and finalized. Thereafter, a chapter on Environmental Impact Assessment for incorporation in the Detailed Project Report is required to be prepared.

**REHABILITATION & RESETTLEMENT**

The Rehabilitation and Resettlement (R&R) aspects of displaced/affected persons of Water Resources Projects are monitored by the Rehabilitation & Resettlement Directorate.
of the Central Water Commission. In this regard collection and compilation of data on R&R measures being taken from Project Authorities. Norms/ Acts/ Policies adopted by the State Governments on R&R of displaced / affected persons of major/ medium irrigation and multipurpose projects are collected and analysed. In respect of 200 existing/ ongoing major & medium reservoir projects, data on rehabilitation measures have been collected and a database has been generated/ updated.

The Central Water Commission is also actively engaged in the preparation of the draft National Policy on Rehabilitation & Resettlement.

APPLICATION OF REMOTE SENSING TECHNIQUES

The plan scheme *Applications of Remote Sensing in Water Resources Development & Management* was approved by the Ministry of Water Resources, to be taken as a continuation of the VIII plan scheme in the IX plan, at an estimated cost of Rs.336.11 lakh. The same scheme has been continued as a continuing scheme of the IX five-year plan. The revised scheme includes new studies in various application areas, in addition to the spill over studies of the previous plan. The following studies have been completed upto November, 2001 :-

1. Watershed Prioritisation of Kadana dam sub-catchment, Gujarat.
2. Sedimentation Analysis of Srisailam reservoir, Andhra Pradesh.
3. Sedimentation Analysis of Tungabhadra reservoir, Karnataka.

Apart from these, the following sedimentation analysis, watershed prioritisation & other studies are to be completed by March, 2002.

i) Lower Bhawani, Tamil Nadu
ii) Panchet, Jharkhand
iii) Maithon, Jharkhand
iv) Krishnaraj Sagar, Karnataka
v) Ukai Sub-catchment, Gujarat
vi) (a) Resource Information System of Subernarekha, Bihar and Orissa
(b) Resource Information System of Betwa river sub-basins, Madhya Pradesh
vii) Drought Assessment Studies of Jaisalmer, Barmer and Jodhpur Districts of Rajasthan.

The scheme was approved to be taken up as an ongoing scheme in the 8th plan and 9th plan periods. The estimated cost of the scheme during the 9th plan period is Rs. 336.11 lakhs. The revised scheme during the 9th plan period includes new studies in various application
areas of water resources, in addition to spill over studies of the 8th plan period.

The above studies are likely to be completed by March, 2002. The approved outlay for 2001-2002 is Rs. 56.00 lakhs which has been revised to Rs. 73.00 lakhs.

**Studies on Drainage Problems in Irrigated Areas**

- The CWC is presently engaged in the collection and compilation of data relating to waterlogging, soil salinity and alkalinity in irrigated commands of the country. Collection of individual States’ data is in progress.

- State-wise status reports on drainage related problems are being prepared. At present preparation of the Status Report of Karnataka State is in progress.

**Identification of Waterlogging, Salinity/Alkalinity affected areas using Remote Sensing Techniques**

The following four studies on “Assessment and monitoring of water logging and salinity/alkalinity affected areas using Remote Sensing Technique” in different commands areas are in progress under the IX Plan Scheme.

1. **Study in Mahanadi Stage-I Command Area, Orissa**: The study has been taken up in collaboration with National Remote Sensing Agency (NRSA), Hyderabad. The total cost of the study is Rs. 12.02 lakh. The final report of the assessment study is expected shortly.

2. **Study in Gandak Command Area (Bihar Portion)**: The study has been taken up in collaboration with the Regional Remote Sensing Service Centre (RRSSC), Jodhpur. The total cost of study is Rs. 7.70 lakh. The draft final report of the study was received and comments have been sent to RRSSC, Jodhpur for compliance. The final report of the assessment study is expected shortly.

3. **Study in Western Yamuna Canal Command Area, Haryana**: The study has been taken up in collaboration with RRSSC, Jodhpur. The total cost of the study is Rs. 11.56 lakh. The final report of the assessment study is expected by January, 2002.

4. **Study in Kosi Command Area, Bihar**: The study has been taken up in collaboration with RRSSC, Jodhpur. The total cost of the study is Rs. 10.43 lakh. The final report of the study is expected by March, 2002.

**PERFORMANCE EVALUATION STUDIES**

The Central Water Commission is carrying out Agro-economic, Socio-economic and Environmental Impact studies of completed irrigation projects.

1. **Performance Evaluation studies covering Agro-economic, Socio-economic and Environmental aspects in respect of the following have been taken up:**
(i) Kangsabati Irrigation Project (West Bengal): Draft Final Report has been received, examined, and TAC meeting for its approval held on 23rd November, 2001.

(ii) Kaldiya Irrigation Project (Assam): Draft Final Report received and TAC meeting for its approval was held.

(iii) Sunei Irrigation Project (Orissa): Draft Final Report received, and TAC meeting for its approval proposed.

(iv) Pazhassi Irrigation Project (Kerala): Draft Final Report has been received, examined, and TAC meeting for its approval was held.

(v) Kanpur Br. Lower Ganga Canal System (Uttar Pradesh): Draft Final Report received, and TAC meeting for its approval proposed was held.

2. Three meetings of the sub group for Term of Reference No.6 of the Working Group on the Major & Medium Irrigation programme for the Xth Five Year Plan (2002-2007) were organized and report finalised and sent for publication.

MONITORING OF RESERVOIR LEVEL AND LIVE STORAGE CAPACITY

The Central Water Commission has been monitoring water levels and storage in respect of important reservoirs in the country on a weekly basis. The total live storage capacity of the reservoirs being monitored is about 131.00 Billion Cubic Metre (BCM). The total live storage capacity created so far in the country is 177.00 Billion Cubic Metre.

The total live storage of these reservoirs as on 16th November, 2001 was 82.67 Billion Cubic Metre. This is against 77.54 Billion Cubic Metre and 96.22 Billion Cubic Metre on the corresponding date, in the year 2000 and average of last 10 years, respectively. The storage status of current year vis-à-vis last 10 years average on the corresponding date is depicted in Figure 10.

Irrigation Performance Overview

1. The CWC is carrying out performance Evaluation of Completed Irrigation Projects. The following studies are being carried out :-

- Performance Evaluation Studies of the Harish Chandra Sagar Project (Rajasthan) and Tawa Irrigation Project (Madhya Pradesh) have been taken up departmentally by the Central Water Commission. The draft report on the Harish Chandra Sagar Project (Rajasthan) has been approved and the report on the Tawa Irrigation Project (Madhya Pradesh) is under preparation.

- Consultation with Government of
Uttar Pradesh is in progress for undertaking a Performance Evaluation Study of the Baigul Reservoir Project & Aggasi Pump Canal, departmentally.

2. The report on the “Cost of Irrigation per hectare of a few selected Command Areas in Major & Medium Irrigation Projects in India” has been finalised and is under printing.

HYDROGRAPHIC SURVEY OF IMPORTANT ACTIVITIES

The Ministry of Water Resources has approved the Standing Finance Committee (SFC) Memorandum on Hydrographic Survey of Important Reservoirs in the country for the IXth Five Year Plan at an estimated cost of Rs.579.22 lakhs. Hydrographic surveys are being got done through consultants – specialised agencies having specialisation in the field of hydrographic survey. Under this scheme, upto March, 2001, the study of 10 reservoirs namely: Matatila (Uttar Pradesh), Konar, Tilaiya (Bihar), Balimala (Orissa), Lingnamakki (Karnataka), Idukki (Kerala), Kakki (Kerala), Jayakwadi, Dharoi (Maharashtra) and Ghataprabha (Gujarat) have been completed, and 80% works of two reservoirs namely, Tenughat and Emerald Avalanche (Tamil Nadu) have been completed. During the current year, Hydrographic Survey of six reservoirs i.e. Tenughat (Jharkhand), Emerald Avalanchye (Tamil Nadu), Minimata (Chhattisgarh), Mayurakshi (West Bengal), Getalsud (Jharkhand) and Ukai(Gujarat) has been completed. Survey of another three reservoirs namely Srisalem (Andhra Pradesh), Nagarjuna Sagar (Andhra Pradesh) & Gandhi Sagar (Madhya Pradesh) is nearby completion.

INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE (ICID)

This is a non-governmental organisation with representation from more than 80 countries with Head Quarters at New Delhi. India is one of the founding Members of the ICID. The mission of the International Commission on Irrigation and Drainage is to stimulate and promote the development of arts, science, techniques of engineering, agriculture, economics, ecology and social sciences in managing irrigation, drainage, flood control and river training applications, including research and development and capacity building, adopting comprehensive projects as well as the latest techniques for sustainable agriculture in the world. Various committees/Working Groups have been constituted by ICID on which the CWC officers are represented to promote these activities.

INDIAN NATIONAL COMMITTEE ON IRRIGATION AND DRAINAGE (INCID) ACTIVITIES

The Indian National Committee on Irrigation and Drainage (INCID) was constituted in 1990 by the Ministry of Water Resources to pursue the mission and activities of the International Commission on Irrigation and Drainage (ICID) in the country. The INCID
Figure 10

STORAGE POSITION OF 70 IMPORTANT RESERVOIRS
(WATER YEAR 2001-02)

TOTAL LIVE CAPACITY OF 70 RESERVOIRS AT FRL 130.55 TH. M CUM.
also looks into the Research & Development activities in the Irrigation and Drainage sectors. Chairman, CWC is the Chairman of INCID and Member (WP&P), Central Water Commission is one of the Members of the INCID. To promote research schemes, and for their expeditious processing and monitoring, four Sub-Committees of INCID have been constituted. These are (i) Irrigation Performance Assessment, History, Education, Training, Research and Development; (ii) Crops, Water Use and Drought Management, Micro and Mechanized Irrigation; (iii) Flood Management, Drainage and Environmental Impacts; and (iv) Construction, Rehabilitation and Modernisation of Operations, Maintenance and Management. Two Sub-Groups were also constituted under the invited research category. The 21st meeting of the INCID was held on 17th April 2001. The 5th meeting of the INCID Sub-Committee-I was held on 12.6.2001 under the Chairmanship of Member (WP&P), CWC.

WORLD WATER COUNCIL

The World Water Council (WWC) has been established with its Head Quarter at Marseille (France) to promote awareness of critical water issues at all levels, including the highest decision making levels, to facilitate efficient conservation, protection, development, planning, management and use of water in all its dimensions on an environmentally sustainable basis for the benefit of all life on earth. Many policy decisions regarding water and decisions regarding international funding are likely to be made by the World Water Council. The Central Water Commission being an apex organisation under Ministry of Water Resources and concerned with the overall development of water resources of the country, has been nominated as an Institutional Member of the World Water Council.

Simulation Studies

The Central Water Commission is dealing with computer based Simulation Studies for Integrated Operation of Reservoir Systems for optimum utilization of water resources. At present, a special study namely “Integrated River Basin Planning and Management – A Demonstration study in Sabarmati basin” is being carried out under the World Bank aided hydrology project in association with the Central Design Organisation, Government of Gujarat and the National Water Academy, CWC, Pune. The study is being done on a river basin simulation software “RIBASIM” provided by the Delft Hydraulics, Netherlands under the hydrology project.

Standardisation Activities

The Reservoir Operations Directorate of the Central Water Commission is dealing with Standardisation activities in the field of reservoirs. A draft BIS code on “Checklist of Reservoir Data” was prepared in March, 2001 and sent to the BIS for further necessary action at their end.

The Director (R.O.) of the CWC is a Member
of the Dams and Reservoirs Sectional Committee of Bureau of Indian Standards. As a Member of the above committee, BIS codes on the subject matter are reviewed as and when required and discussions on various BIS codes related to the subject matter are held during the meetings of the above committee.

**REPRESENTATION IN VARIOUS COMMITTEES**

a) **Technical Advisory Committee (TAC) for Institute of Water Studies, PWD, Tamil Nadu**

The Public Works Department, Government of Tamil Nadu had constituted the TAC originally on 2.7.91 to guide the research activities of the Institute. The TAC was reconstituted in Jan., 1995 in which two officers of the CWC were included. The Chief Engineer, Basin Planning & Management Organisation was included as Member and Director, Reservoir Operation Directorate as alternate Member. So far 6 meetings of the TAC have been held.

b) **Working Group of Water Resources Division of National Institute of Hydrology, Roorkee**

Chief Engineer, BP&MO is Member of the “Working Group for Surface Water Group of Divisions” of the National Institute of Hydrology, Roorkee. The meetings of the working group are held about twice in a year in which progress of studies and research work done by the National Institute of Hydrology is reviewed and the programme for the future is decided. The last meeting was held on 10.10.2001.

c) **Director (R.O.) of CWC is Member of the “Working Group on Framing of Integrated Policy for regulation and operation of Reservoirs in Narmada basin”**.

The Chairman of the Working Group is Member (Civil), Narmada Control Authority. So far only two meetings of the Working Group have been held. The last meeting was held on 27-09-2001 at Vadodara.

d) **R.O. Directorate of Central Water Commission is the nodal directorate for the activities of the Indian Water Works Association, Mumbai. The CWC is an organizational life member of the Association, and Director (RO) is the permanent invitee in the Council of Management of the Association.**

**WATER RESOURCES ECONOMICS STUDIES**

The following studies are being undertaken.

i) **Socio-Economic Performance Evaluation Studies:**

The Final Report of “Irrigation Realities through Plans” has been approved and is under release.

ii) **New Socio-Economic, Agro-Economic and Environmental Impact Study of Ukai Irrigation Project (Gujarat)**

The Draft of report has been prepared.
DOCUMENTATION OF WATER AND RELATED DATA

(i) Publications brought out by the CWC:-

- Pocket Book on Water Data, 2001
- Pricing of water in Public System in India, 2001

(ii) Publications scheduled to be brought out:-

- Integrated water year book on hydrological data
- Flood Control Drainage and Anti sea erosion Projects

HYDROLOGICAL DATA: UPDATION & COMPUTERISED DATA BANK

Actual Progress upto 15th November, 2001

All Data Entry on Flow & Sediment Load for 1700 Site Years received upto 15th November, 2001 have been completed for Non-Classified River Basins viz. Krishna, Godavari, Mahanadi Cauvery, etc.

Forecast of Achievement up to March, 2002.

Data Entry on Flow & Sediment Load for 700 Site Years is likely to be completed for Non-Classified River Basins mentioned above during the period from 16.11.2001 to 31.03.2002.

COMPUTER CENTRE

(i) Four training Courses, three at CWC Head Quarter, New Delhi and one at Chief Engineer offices at Lucknow, on use of computer related software packages and Internet, were conducted. Two more Training Programmes are scheduled to be organised during the next Quarter (January – March, 2002).

(ii) Continued support towards operation; maintenance and management activities associated with Computer Hardware/ Software was provided to various user Directorates of Central Water Commission.

MANPOWER PLANNING

The Manpower Planning Cell of Plant and Machinery Directorate, Central Water Commission was created in 1979 to carryout various studies on Manpower Potential. In this Cell, analysis of data on Expenditure and Employment Generation in Major and Medium Irrigation and Multipurpose Projects is undertaken to prepare reports on various related issues on manpower.

An “Advisory Group” on Manpower Planning is working under the Chairmanship
of Chief Engineer (Central Mechanical Organisation), Central Water Commission for the purpose of guidance for carrying out these studies.

1. Basic Data for 52 projects has been computerised for the report i.e. “Expenditure and Employment Statistics in Major and Medium Projects (under construction)” and preparation of the report is in progress, which is 10th in the series of publication.

2. The publication of the report on “Employment Generation in Operation and Maintenance Stage of Irrigation Projects” has been published and distributed to the concerned Officers in the Ministry of Water Resources and other user agencies.

3. A Chapter on “Employment Generation, Training and Career Management” for Xth Five Year Plan 2002-2007 was prepared in the Cell on behalf of the Sub-Group (Terms of reference No.9) to assist the Working Group on Major and Medium Irrigation Projects in the Ministry of Water Resources.

TRAINING OF PERSONNEL

The Training Directorate of the Central Water Commission arranges training for in-service officers of the CWC at all levels. These training programmes are held both within and outside the country. Officers of the CWC are regularly deputed to various National and International seminars, conferences, workshops etc. Induction training for newly recruited Assistant Directors are also being conducted by Training Directorate, in addition to their training at the National Water Academy, Pune.

The Directorate also arranges Apprenticeship training for fresh Engineering Graduates/ Diploma Holders/ Vocational Certificate Holders, in collaboration with Board of Apprenticeship Training, Kanpur. A few students of Engineering Degree Courses are given practical training in the CWC every year for a period of four to eight weeks.

In addition, Director (Training) is member-secretary of i) Standing Committee on Education and Training in Water Resources set up by MOWR ii) Committee on Training of CWES (Group A) officers and iii) member of the Standing Committee for operationalization of the Rajiv Gandhi National Ground Water Training and Research Institute (RGI) of the Central Ground Water Board.

Details of the training activities conducted by Training Directorate during 2001-2002 (up to October, 2001) are furnished below, along with target for the period 11/2001 to 3/2002. The details are also indicated in the form of a pie chart as placed at figure 11. Details of the officers deputed abroad for training and to attend seminars/conferences etc. are given in Annexure I.
TRAINING DIRECTORATE, CWC

ACHIEVEMENTS UPTO OCTOBER, 2001

- Sponsoring officers for training, attending seminars/workshops etc. in India and abroad (154)
- Conducting of training courses for in-service officers and staff including induction training course for newly recruited Assistant Directors (426)
- Training of unemployed graduate/diploma engineers/vocational certificate holders under Apprentice ACT, 1961 (60)
### Name of activities

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of activities</th>
<th>Achievements up to October, 2001</th>
<th>Target from November, 2001 to March, 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sponsoring officers for training, attending seminars/ workshops etc. in India and abroad</td>
<td>154 Officers</td>
<td>100 Officers</td>
</tr>
<tr>
<td>2</td>
<td>Conducting of Training Courses for in-service officers and staff including induction training course for newly recruited Assistant Directors</td>
<td>426 Officers (21 courses)</td>
<td>325 Officers (20 courses)</td>
</tr>
<tr>
<td>3</td>
<td>Training of unemployed graduate/ diploma engineers/ vocational certificate holders under App. Act, 1961</td>
<td>60 trainees</td>
<td>10 trainees</td>
</tr>
</tbody>
</table>

### Details of officers deputed abroad for attending training/ Seminars/ Conferences/ Workshops/ Study Tours etc. during the year 2001-2002 (up to October, 2001)

<table>
<thead>
<tr>
<th>Training Name of officer</th>
<th>Period</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training programme on Environmental Economics at Washington, D.C., USA</td>
<td>Shri A.K. Gautam, Director</td>
<td>16-27 July, 2001</td>
</tr>
</tbody>
</table>

**Seminars/ Conferences/ Workshop/ Study Tours etc.**

<table>
<thead>
<tr>
<th>Training Name of officer</th>
<th>Period</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>21st Meeting of ISO/TC-113</td>
<td>Shri Suresh Chandra, Member (WP&amp;P)</td>
<td>14-18 May, 2001</td>
</tr>
<tr>
<td>High Level Consultative Meeting in Developing and Framework for Flood Forecasting in Hindukush Himalayan Region</td>
<td>Sh.S.B. Srivastava, Chief Engineer Sh.Rajesh Yadav, Assistant Director</td>
<td>15-18 May, 2001</td>
</tr>
</tbody>
</table>
Registration of Consultancy Firms on Water Resources sector

For development of Consultancy Services in the Water Resources sector, the CWC invites various consultancy Firms and individual Consultants for registration. Qualified and experienced Firms and individual professionals are registered for empanelment in the CWC for a validity of 5 and 3 years respectively, unless the registration is renewed. These panels of consultants are circulated to the State Governments, Central Agencies/Project Authorities for meeting their consultancy requirement in the field of water resources development. There are now valid registered 35 consultancy firms and 3 individual consultants in CWC out of which 3 firms and 2 individuals have been registered during this year.

CWC Website

The Central Water Commission has an existing website which can be accessed on the new address http://www.cwc.nic.in. The website has varied information on the role of the CWC in the development of Water Resources and its schematic achievements. Presently this website is under review for updating.

Compendium of Technical Papers

CWC Officers have been writing various technical papers, articles for publication in various national and international forums like seminars, conferences, symposium, training courses etc. in addition to publishing in journals, technical publications, books etc. They represent the CWC as water engineering experts and disseminate knowledge on Water Resources Technology and its developments on a continuous basis. A compendium of technical papers by CWC Officers is being prepared for record and reference. A set of six volumes of the compendium has already been prepared and is available for reference in TC (Technical Coordination) Directorate.

<table>
<thead>
<tr>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Meeting of India-China Co-operation on Information Sharing on Natural Disasters in Common Rivers</td>
<td>Sh.M.L. Goyal, Commissioner (ER) Sh. Sanjeev Aggarwal, Director 7-10 June, 2001</td>
</tr>
<tr>
<td>2nd Regional Course on Urban Flood Mitigation</td>
<td>Sh. Devendra Sharma, Director</td>
</tr>
<tr>
<td>69th Annual Meeting of International Committee on Large Dams (ICOLD)</td>
<td>Sh. M. Gopalakrishnan, Chief Engineer</td>
</tr>
<tr>
<td>International Workshop on Mediation of Water Disputes</td>
<td>Sh. V. Saithanyamurthi, Director</td>
</tr>
</tbody>
</table>
PROGRESSIVE USE OF HINDI

All letters received in Hindi are invariably replied to in Hindi. All such documents referred to in Section 3(3) of the Official Act, such as General Orders Notification, etc. are issued in Hindi and English bilingually. The progress made in the implementation of important instructions issued by the Department of Official Language regarding the progressive use of Hindi for Official purpose and the Official Language Act, 1963 and the Official language Rules, 1976 is watched and reviewed through the quarterly progressive report, regularly.

TRANSLATION WORK


HINDI WORKSHOP

To generate awareness about Hindi and give practical knowledge of Official Language provisions and incentive schemes etc., Hindi workshops are organised in the Commission regularly. In the workshops the participants are trained in Hindi noting/ drafting and administrative/ technical vocabulary. One Hindi workshop was organised during the year in which 23 officials were imparted practical knowledge for the use of Hindi in official work. Apart from this three Hindi workshops were also organised for CWC offices at Bhubaneshwar, Nagpur and Bhopal. A similar workshop was held at Gangtok during 3-4 December, 2001.

TRAINING UNDER HINDI TEACHING SCHEME

During the year under report 17 officers were nominated for training in the January session, out of which 3 officers in prabodh, 7 in praveen and 2 in pragya were declared successful. 17 officers have been nominated in the July session.

INSPECTION

With a view to review the progressive use of Hindi and also to keep a watch on the compliance of orders, instructions etc., subordinate offices located at Bhubaneshwar, Pune, Nagpur, Baroda, Bhopal, Bangalord, Chanditgarh and Patna were inspected during the year. Effective steps were taken for rectifying short-comings noticed during the inspection.

HINDI PAKHWARA

Hindi Pakhwara was organised in the Commission on a large scale from 14-27 September, 2001. As a part of the celebrations 9 competitions were organised. All the winners who stood first, second and third were awarded cash prizes as well as certificates of merit, in the closing ceremony. Besides this consolation prizes were also awarded to the participants of different competitions. Three field offices of the Central
Water Commission i.e., Lower Yamuna Division, Agra, Wain Ganga Division, Nagpur, Sikkim Investigation Division, Sikkim were awarded Raj Bhasha Chal Shield for the year 2000-2001. Running shields were awarded to Establishment-IX and River Data Directorate in the Commission for doing maximum work in Hindi during the year. Merit certificates were also awarded to the officers of shield winning offices for their excellent contribution in the progress of the Official Language. One personal shield was also awarded to editor Bhagirath (Hindi) on this occasion.

**COMPUTER TRAINING**

One training programme for use of Hindi software on PCs was also organized for CWC staff in the month of July, 2001, in which 15 officers were imparted training.

**VIGILANCE/ DISCIPLINARY CASES**

Vigilance/ Disciplinary cases and complaints received against officers & staff of CWC received proper and prompt attention. During the year 27 complaints were received and taken up for investigation. Investigation was completed in 31 cases (including old cases) and a final decision was taken in respect of 23 cases out of which in 5 cases, the officials found guilty were awarded major/ minor penalties. The break-up of vigilance/ disciplinary cases in respect of different category of officers and staff are as follows:-

<table>
<thead>
<tr>
<th>Category of Officers/ Staff</th>
<th>Gr. A</th>
<th>Gr. B</th>
<th>Gr. C</th>
<th>Gr. D</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) No. of cases pending at the beginning of the year</td>
<td>22</td>
<td>8</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>b) No. of cases added during the year</td>
<td>16</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>c) No. of cases in which investigation was completed</td>
<td>15</td>
<td>5</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>d) No. of cases disposed of during the year</td>
<td>11</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>e) No. of cases pending at the end of the year (a + b – d)</td>
<td>27</td>
<td>7</td>
<td>29</td>
<td>11</td>
</tr>
</tbody>
</table>

In addition to this, one short-term training course on vigilance/ disciplinary matters for the benefit of officers and staff of field offices of the CWC was conducted at Lucknow from 27th to 31st August, 2001. Vigilance Awareness Week was also observed in the CWC HQ and 5 regional offices for the period 31st October to 6th November, 2001.
REDRESSAL OF GRIEVANCES

Effective measures have been taken to strengthen the machinery for the redressal of grievances in respect of serving and retired employees of the CWC. Secretary, CWC has been designated as Staff Grievances Officer to deal with cases of serving/retired personnel which are not redressed at lower levels. Both Public Grievances and that of staff are redressed by him.

The progress made in the disposal of pending grievance cases during the year 2000-2001 is as under:

1. No. of grievances pending as on 31.03.2001 : 27
2. No. of grievances received during the year : 22
3. No. of grievances disposed of during the year : 23
4. No. of grievances pending as on 31.12.2001 : 26

A complaint Committee has been constituted under the Chairmanship of Smt. Usha Gandhi, Under Secretary to look into the complaints of women employees working in Central Water Commission at the Headquarter and also in its field formations.
### CENTRAL GROUND WATER BOARD

#### HIGHLIGHTS

- An Accelerated Exploration Programme of Ground Water has been initiated in the drought affected states of Madhya Pradesh, Chhattisgarh, Orissa, Gujarat and Rajasthan. Under the plan 1660 wells are targeted for construction during 2001-2002 in these drought affected states. Till January, 2002, 791 wells have been constructed out of which 152 wells by deploying departmental rigs and 639 wells by contractual drilling. An accelerated exploration of ground water in the water scarcity districts of Uttar Pradesh has also been initiated to construct 200 tubewells.

- A revised work plan for deep exploration of ground water in the foothills of Himalayas was prepared to incorporate the ‘Bid for Deep Exploration in Ganga Basin, Uttaranchal and Uttar Pradesh.

- Under Artificial Recharge to Ground Water, 26 projects were approved for implementation in 10 states for the construction of various Artificial Recharge Structures.

- Under R&D Studies a report on Evaluation of Performance of various Arsenic Removal Equipments installed in Arsenic affected areas of West Bengal was finalized, on the basis of work that was carried out in collaboration with UNIDO. An arsenic mitigation cell was established within the Chemical Laboratory of CGWB, ER. Arsenic free aquifers have been identified in four different sites under ground water exploration programme.

- Under Central Ground Water Authority the following important activities were undertaken:-
  - CGWA continued regulating ground water development in Parts of Delhi, Haryana, Punjab, U.P, Rajasthan, W.B, & Gujarat.
  - CGWA has directed all Group Housing Societies in NCT, Delhi (except those societies located in Yamuna Flood Plain area) Faridabad & Ballabghar, Ghaziabad, Gurgaon town to adopt the Roof top rain water harvesting system in their premises by 31st December, 2001.

- Ground water resource estimation is being revised based on GEC ‘97 methodology. The work is under progress. A committee has also been set up to look into the methodology for ground water resource assessment in hard rock terrain conditions.
CENTRAL GROUND WATER BOARD

ORGANISATION

The Central Ground Water Board (CGWB) is a subordinate office of the Ministry of Water Resources. It is responsible for carrying out nation-wide surveys and assessment of ground water resources and guiding the states appropriately in scientific and technical matters relating to ground water. The Central Ground Water Board has generated valuable scientific and technical data through regional hydrogeological surveys, ground water exploration, resource and water quality monitoring and research and development. The board also organizes in-service training programmes for its own as well as other Central and State Government officials. It assists the States in developing broad policy guidelines for development and management of ground water resources including their conservation, augmentation and protection from pollution, regulation of extraction and conjunctive use of surface water and ground water resources.

The Board is headed by a Chairman, who is assisted by four Members, with four wings which are Surveys, Assessment and Monitoring (SAM) Wing; Sustainable Management and Liaison (SML) Wing; Exploratory Drilling and Materials Management (ED&MM) Wing and Training and Technology Transfer (T&TT) Wing. The Central Ground Water Authority was constituted on 14th January, 1997 under Environmental (protection) Act, 1986 for the purpose of regulation and control of ground water development and management. The Board has 17 Regional Offices, each headed by a Regional Director with an equal number of supporting Engineering offices and eleven State Unit Offices for undertaking various field activities in the country.

MAIN ACTIVITIES AND PROGRESS (UPTO NOVEMBER 2001) OF THE CENTRAL GROUND WATER BOARD ARE AS FOLLOWS:

DISTRICT GROUND WATER DEVELOPMENT AND MANAGEMENT STUDIES (REAPPRAISAL HYDROGEOLOGICAL SURVEYS)

Ground water being replenishable and dynamic in nature, it becomes essential to conduct periodical surveys to assess the quality and quantitative changes in the ground water regimes in time and space. These surveys also help in measuring the impact on local ground water regime of various developmental activities like introduction of surface irrigation scheme urbanization and withdrawal of ground water. During 2000-2001, an area of 1.97 lakh sq. km was covered under these surveys and during 2001-2002, against a target of 2.09 lakh sq. km, an area of 2.12
lakh sq km has been covered in different states. Detailed year-wise targets vis-à-vis achievements upto 2001-2002 (upto November, 2001) is shown in figure 1.1.

**GROUND WATER EXPLORATION & ACCELERATED EXPLORATION PROGRAMME**

The exploration of ground water to study the sub-surface geological and hydrogeological setups and evaluate various aquifer parameters is carried out by the Board with a fleet of 88 drilling rigs (41 Direct Rotary, 33 Down the Hole and/ Percussion / Combination types 14). During 2001-2002, the Board has drilled 461 exploratory boreholes, 88 observation boreholes, 12 piezometers, 3 deposit wells, totaling 564 (including 287 wells drilled in drought and 47 wells drilled in tribal areas) upto January, 2002 against the target of 801 wells (Exploratory Wells-605, Observation Wells-187, Slim Holes-6 and Deposit Wells-3) in various terrains. Detailed year-wise targets vis-à-vis achievements upto 2001-2002 (upto January, 2002) is shown in figure 2.1.

During the current drought prevailing in the state of Madhya Pradesh, Chattisgarh, Orissa, Gujarat and Rajasthan, the CGWB has prepared a contingency plan for drought amelioration. Under the plan 1660 wells are targeted for construction during 2001-2002 in these drought affected states. Out of this target 240 wells are to be constructed by deploying departmental rigs and balance 1420 wells (which includes 175 wells targeted for 1st phase of work but could not be taken up during 2000-2001) by inviting participation of private agencies. Till January, 2002, 791 wells have been completed out of which 152 wells by deploying departmental rigs and 639 wells by contractual drilling. An accelerated exploration of ground water in the water scarcity district of Uttar Pradesh has been initiated to construct 200 tubewells.

**GROUND WATER EXPLORATION IN THE GANGA BASIN**

The work done under Deep Drilling for Ground Water Exploration in Ganga Basin till November, 2001 are as follows:-

i. A revised work plan for deep exploration of ground water in the foothills of Himalayas was prepared to incorporate the 'Bid for Deep Exploration in Ganga Basin, Uttaranchal and Uttar Pradesh'.

ii. To study the recharge prospect in deeper aquifers, a Morphohydrogeological study is being continued in Gaula Watershed in Kumaon Himalayas. The various morphometric parameters and area of sub-watersheds were calculated. Analysis of the data is under progress.

iii. Mapping of Siwalik Formations continued in between the Main Boundary Fault and Himalayan Frontal Fault to know its tectonic setup and the recharge possibilities of deep Siwalik aquifers underlying the Ganga Alluvial Plains. The work is still in progress.
Figure 1.1


- Target
- Achievement

AREA IN SQ. KM.

REGIONS

NWHR  WR  NCR  CR  MER  NER  SR  SECR
Figure 2.1

REGION WISE STATUS OF GROUND WATER EXPLORATION (DURING 2001-2002) UPTO JANUARY, 2002

The figure shows the number of boreholes drilled in different regions during 2001-2002. The regions are labeled as NWHR, NWR, WR, WCR, NCR, NCCR, CR, NR, MER, ER, NER, SER, SR, SWR, SECR, and KR. The bar chart compares the target and achievement in drilling.
iv. Various basin & lithology-wise datas for the report on 'Deep Aquifers of India' were compiled.

**MONITORING THROUGH THE NATIONAL HYDROGRAPH NETWORK STATIONS**

The Board is monitoring the ground water levels in the country four times a year (January/May/August/November) through a network of 15700 National Hydrograph Stations. The water samples collected during the pre-monsoon monitoring are analysed for the purpose of ascertaining the changes in chemical quality of ground water. Monitoring of May, August and November 2001 completed in all the Regions except in the Western Region, Eastern Region and Northern Region where the monitoring of November, 2001 is in progress.

**HYDROLOGY PROJECT**

The World Bank aided Hydrology Project is being implemented in eight Peninsular States of India. The objective of the project is to improve the existing data collection network through construction of purpose-built observation wells and replacement of some of the existing non-functional observation wells; setting up and upgradation of chemical laboratories; establishment of national and regional data centers, integration, validation, processing and dissemination of data; and increase the capabilities of the incremental staff through training. The Board is the nodal agency for the ground water sub-sector of the project.

Under the project, a total of 2239 piezometers have been constructed. 53 newly constructed piezometers have been linked with the Great Trignometrical Survey (GTS) Bench Mark till November, 2001. Data centers at 5 Regions have been modified for accommodating the newly procured hardware. As targeted, 1000 Digital Water Level Recorder (DWLR) have been procured and out of which 600 have been installed and remaining 400 DWLRs are under testing by the supplier. 31 sets of equipments have been procured for the 12 level II + and 2 level III labs. Entire ground water level data has been computerized and 50% data pertaining to water quality and exploration has been keyed in. The contract for Dedicated software for Ground Water Data Processing Centers is under implementation. Hardware and System Software for all 28 sites of CGWB and 132 Sites of State Ground Water Departments and 2 sites of National Institute of Hydrology have been delivered and installed. Development of dedicated software for Ground Water Data Processing Centers is at an advanced stage. The first stage application is being installed at National Data Center, Faridabad and is under testing by various state ground water agencies. Procurement of hardware for the Data Storage Centers for 10 sites is in advanced stage. A total of 84 officers have been trained in various training courses. At the Central Level a Hydrology Data User Group (HDUG) consisting of members from various Governmental Departments, NGOs, and Educational Institutions is under formation with MOWR. Two R&D studies at South South Eastern Coastal Region (SECR), Chennai and Kerala Region (KR), Trivandrum is in advanced stage.
Drilling through Hard Rock under Ground Water Exploration Programme

Smt. Bijoya Chakravarty, Union Minister of State for Water Resources with the Staff of the field office of CGWB in Kerala
Smt. Bijoya Chakravarty, Union Minister of State for Water Resources inspecting the site with the officers in Kerala.

Smt. Bijoya Chakravarty, Union Minister of State for Water Resources during her field visit in Kerala.
STUDIES ON GROUND WATER RECHARGE

The Central Ground Water Board under the Ministry of Water Resources is operating a Central Sector Scheme for Artificial Recharge studies at an estimated cost of Rs 25.00 Crores. The pilot scheme is being implemented in "Over Exploited", "Dark" and "Grey" Blocks, potential areas having surplus monsoon runoff and sufficient subsurface storage, and also areas of ground water pollution and hilly terrains. Recharge structures like Percolation tanks, Check dams, Recharge wells, Recharge shafts/pits, Rain water harvesting, spring development and subsurface dykes are envisaged for construction under this scheme at 144 places in 23 States/ UTs in the country.

The objective of the scheme is to evolve standard and economic designs of recharge structures for various types of hydrogeological setups. The scheme is for four years and commenced in the year 1998. The construction of these structures is expected to arrest the decline in the ground water table and provide additional irrigation benefits. Besides augmenting the recharge to ground water, this scheme is also helping in upgrading the technical competence and skills of the personnel in the State and NGOs for taking up such works at other places.

In the year 2001-2002 till November 2001, 26 recharge projects have been approved at a cost of Rs 1461.00 lakhs for implementation in 10 states/ UT (Given in Annexure A). In 49 recharge projects, construction of the recharge facility is completed and is being monitored to study the impact of recharge on ground water regime. The civil work in other recharge projects is under various stages of progress. Impact assessment of completed recharge projects has indicated additional recharge, sustainability of dug wells / tubewells, decrease in soil erosion, improvement in fauna and flora and change in socio economic status of farmers in the benefited zone due to increase in crop production and sustainability of availability of ground water through out the year. Completed structures like percolation tanks, check dams in Maharashtra, Madhya Pradesh & Kerala States have indicated rise in ground water level of 0.5 meter to 3.0 meter in the adjoining areas of 25 to 525 Hectare & increase in crop intensity two to three crops in a year.

TECHNICAL EXAMINATION OF MAJOR AND MEDIUM IRRIGATION SCHEMES

As per the directives of the Steering Committee on Irrigation projects constituted by the Planning Commission, the Board is scrutinizing major and medium irrigation project reports/proposals sent by the State Governments. Recommendations are being made for including programmes for the development of the ground water component in these projects so as to bring an integrated development of the total water resources of the command. The Board is also scrutinizing the reports on preliminary water balance studies and feasibility studies of link projects of various basins/sub-basins prepared by the National Water Development Agency. Projects for the development of Ground
Water for use in power plants are also scrutinized by the Board and it advises the concerned agencies about the feasibility of developing ground water. Nine proposal/schemes have been scrutinised till November, 2001.

REPORTS, MAPS AND ATLASES

The results of the investigations undertaken by the Board are documented in the form of technical reports. These reports have been categorised as project reports, survey reports, district reports, state reports, basic data reports, maps and atlases. During 2000-2001, 24 District Reports were brought out by the Board. During 2001-2002, 43 District Reports are being compiled. A total of 21 district Hydrogeological maps (1:250,000 scale) along with brief write-up have been prepared during 2000-2001 for the States of Rajasthan, Maharashtra, Uttar Pradesh, Bihar, Madhya Pradesh, Chhattisgarh, Karnataka, Punjab, and Kerala. A total of 41 district Hydrogeological maps (1:250,000 scale) along with brief write-up are being compiled during 2001-2002. The Hydrogeological atlas of Haryana is under finalisation whereas the atlases of Kerala, Uttar Pradesh and Madhya Pradesh have been finalized for printing. During 2001-2002, a total of 6 Hydrogeological atlases of Punjab, Chandigarh, Dadra & Nagar Haveli, Nagaland, Pondicherry and Sikkim are under preparation.

WATER QUALITY ANALYSIS

The Board has 16 chemical laboratories in the Regional Directorates and one Hydrochemical R&D laboratory at Faridabad to analyze water samples collected from Hydrograph Stations and those collected during surveys, exploration and other investigations (water quality and pollution studies etc.). About 13000 samples have been analysed upto November, 2001 and about 25000 samples will be analysed during 2001-2002 for assessing the ground water quality and its suitability for different purposes like drinking, agriculture and irrigation, industrial purposes.

Some regional laboratories have been provided with modern instruments for carrying out analysis of organic compounds to monitor the impact of use of fertilizers, pesticides and insecticides, oil spills solids wastes disposal dumps etc. The Board has acquired sophisticated equipments under the project "Improvement of equipments for water quality monitoring in India" under Japan's grant-in-aid programme.

R&D PROJECT STUDIES IN RESPECT OF HIGH INCIDENCE OF ARSENIC IN GROUND WATER OF WEST BENGAL

The work done under the project till November, 2001 are as follows:-

i. A report on Evaluation of Performance of various Arsenic Removal Equipments installed in Arsenic affected areas of West Bengal was finalized, on the basis of work that was carried out in collaboration with The United Nations Industrial Development organization.
The work was subsequently presented in a Workshop entitled "Arsenic mitigation Search for Sustainable Solution" organised by UNIDO.

ii. Arsenic content of some selected food items (60) was determined.

iii. Hydrogeological test (3) were carried out to assess the impact of pumping in arseniferous aquifer.

iv. Heavy metal analysis of arsenic rich water was completed (70 samples).

v. 18 samples were analysed to ascertain the efficacy of different filters by filtering arsenic rich water through them at a controlled rate.

vi. Evaluation of different filters (3 nos.) by filtering arsenic rich water of the same concentration (1.7 mg/l) was carried out.

vii. An arsenic mitigation cell was established within the Chemical Laboratory of CGWB, ER.

viii. A project proposal for the propagation of Pteris Vittata - a fern absorbing arsenic, to regulate Arsenic Sludge is under formulation, which will be carried out in collaboration Botany Deptt. of Kalyani University.

ix. A project proposal for construction of piezometers, for monitoring arsenic contamination, utilization in Arsenic affected areas of parts of West Bengal and Bihar has been approved.

x. Arsenic Atlases is under preparation - depiction of arsenic concentration in different blocks indicating depth wise variation of arsenic in North 24 Parganas and total Chemistry.

xi. Arsenic free aquifers have been identified and wells have been completed in four different sites by way of ground water exploration.

R & D PROJECT STUDIES IN RESPECT OF ARRESTING SALINITY INGRESS THROUGH GROUND WATER RECHARGE IN ORISSA

The coastal tract of Orissa is traversed by numerous creeks led by tidal rivers like MATEI, SALANDI and BAITARINI. It is observed that tidal water from these rivers flows into the creeks twice a day. The tidal water in the creeks remains fresh up to the middle of March and subsequently as the flow in the rivers is reduced. Water becomes saline due to tidal action which remains up to June. The creeks Haldiganda, Karangi, Nuanai, Kaudia, Badaharipur in Bhadrak district, Kani nai in Kendrapara distt. and Talsuan in Puri distt. were identified for arresting saline ingress through ground water recharge.

The CGWB has taken up detailed Hydrogeological Survey of the area to study ground water quality as well as recharge component to be induced due to impounding fresh water in the creeks and subsequent irrigation in the Project area. Sites for construction of 35 shallow piezometers upto a depth of 40 m have been identified indifferent and Contract has been started. Till end of November, 2001, 4 piezometer wells
have been constructed in the project area. Pre-
monsoon and Post-monsoon water level
monitoring of observation wells in all creeks
have been carried out 100 water samples
have been collected and are being analysed
in the laboratory. 14 vertical electrical
soundings were carried out in the area to
delineate saline-fresh water interface in the
creek.

The joint inspection team including WAPCOS,
the State Water Resources Department and
the CGWB have identified structures required
in the creeks. The State Water Resources
Department has taken steps for construction
of these structures. The scheme has been
approved by the Ministry and sanctioned for
Rs. 592.00 lakhs.

RESEARCH & DEVELOPMENT SCHEMES

The Central Ground Water Board(CGWB) has
a scheme on Research and Development.
Under this scheme projects are being
sanctioned to be implemented by Research
and Development Organizations. 3 R&D
Projects have been approved by the R&D
committee on ground water and are awaiting
formal approval. 9 ongoing R&D schemes
are at the verge of completion.

CENTRAL GROUND WATER AUTHORITY

The Central Ground Water Authority(CGWA)
has been entrusted with the work of regulation
and control of ground water development and
its management throughout the country.

Achievements of Authority are as follows-
i. Declaration of areas as " Notified Areas" from consideration of over-
development and quality deterioration

The Central Ground Water Authority
continued regulating ground water
development in (i) South district of NCT Delhi
(ii) South west district of NCT Delhi (iii)
Municipal Corporation of Faridabad &
Ballabhgarh, Haryana (iv) Ludhiana, Punjab
(v) Union Territory of Diu (vi) Municipal
Corporation of Ghaziabad, U.P. (vii) Jhotwara
Block, Rajasthan (viii) Halda Industrial
complex, Medinipur, W. B. (ix) Gandhinagar
taluka, Gandhinagar district, Gujarat (x)
Yamuna Flood Plain; NCT Delhi (xi) Gurgaon
town and adjoining industrial areas of
Gurgaon district, Haryana. Registration of
ground water abstraction structures was
carried out in Gurgaon Town and adjoining
industrial areas and more than 8500 strcutures
has been registered. Registration of
abstraction structures were also continued in
NCT Delhi. In case of violations of the
directives, action was also taken.

ii. Direction for adoption of Roof Top
Rain Water Harvesting System

The Central Ground Water Authority has
directed all Group Housing Societies in NCT,
Delhi, except those societies located in
Yamuna Flood Plain area or where water
levels are within 8m below ground water level,
who are exploiting ground water to adopt the
Roof top rain water harvesting system in their
premises by 31st December, 2001. A public
notice directing all Residential Societies/
Schools/Hotels/Industrial Establishments
located in the Notified Areas of South & South-West District, NCT, Delhi; Municipal Corporation of Faridabad & Ballabgarh, Faidabad & Ballabghar, Faridabad District, Haryana, Municipal corporation of Ghaziabad, Ghaziabad district, U.P. Gurgaon town & adjoining industrial areas of Gurgaon district, Haryana to adopt Roof Top Rain Water Harvesting System in their premises was issued extending the last date from 31st May, 2001 to 31st December, 2001.

iii. Training on rain water harvesting

The CGWA has organized four one-day training programmes on Rain Water Harvesting including Roof Top Rain Water Harvesting at Central Soil & Materials Research Station, New Delhi on 1.8.2001, Faridabad (Haryana) on 4.5.2001 and 23.10.2001 (in association with Faridabad Industries Association) and Gurgaon (Haryana) on 7.11.2001. The objective of these training courses was to educate the masses about the benefits of Rain Water Harvesting in controlling the decline of ground water levels, and to propagate innovative and economical techniques of Rain Water Harvesting including Roof Top Rain Water Harvesting in the urban environment. 40 more such programmes are proposed to be organized during 2001-2002.

iv. Organising Mass Awareness Programme

The CGWA organized a mass awareness programme at Thano, district Dehradun (U.P.) on 12.5.2001 to educate the common people about the judicious and optimum utilization of ground water and the problems related with the ground water pollution and over-development. 32 more such programmes are proposed to be organized throughout the country during 2001-2002.

v. Clearance to Industries for Withdrawal of Ground Water

During this period permission to fourteen (14) industrial establishments have been accorded for withdrawal of ground water for industrial use.

vi. Meetings of the Authority

During this period two meetings of the Authority were held on 2.8.2001 and 12.11.2001.

vii. Registration of Drilling Contractors

During this period 127 persons/agencies engaged in the business of construction of water wells have been registered.

viii. Registration of Mineral Water Industries

More than 120 persons/agencies engaged in the business of mineral water industries have registered themselves with the authority.

RAJIV GANDHI NATIONAL GROUND WATER RESEARCH AND TRAINING INSTITUTE, RAIPUR (CHATTISGARH)

The Rajiv Gandhi National Ground Water
Research and Training Institute (RGNGWR & TI) started functioning from Raipur (Chattisgarh) in May 1996. The Institute is being established with the aim of starting training courses, seminars, symposia etc., at national as well as international level and provide research facilities in the field of ground water in India.

In accordance with the directives of the Ministry of Water Resources, the buildings of RGNGWTRI at Raipur were handed over, to the Chhatisgarh government in December, 2000 and thereafter all the courses of the RGNGWTRI Training Calendar (2000-2001) were terminated. Several initiatives were taken to start the Institute activities at WALMI Bhopal but as the WALMI buildings were in dilapidated condition end required huge repairs RGNGWTRI could not be housed there. However, efforts were made to conduct few courses like Induction Level Training Course for the Engineers and the Scientists of the department, Short course on management and drillers training course. Presently a decision has been taken to conduct various courses at different regions of the Central Ground Water Board. The training calendar of year 2002-2003 is under preparation.

Two training courses, one on the "Water Well Drilling-Techniques, Equipment & Management for 12 weeks (July-September, 2001) & other "Management Principles & Practices" of 2 weeks duration were held at Rajiv Gandhi National Ground Water Training and Research Institute (RGNGWTRI), Bhopal. There were 37 participants in both the training courses. The remaining training courses of RGNGWTRI could, not be held owing to the relocation of RGNGWTRI. The Preparation for the Induction Level Training Course (16 weeks) have been completed to begin the 16 weeks course in December, 2001.

**GEOPHYSICAL STUDIES**

As an integral part of its activities, the Board undertakes geophysical studies to support and supplement hydrogeological surveys, ground water exploration and short-term water supply investigations. Besides these studies, geophysical activities were also undertaken to demarcate bedrock configuration and thickness of overburden and saline-fresh water interface.

i. **Central Geophysical Cell**

The Central Geophysical cell is entrusted with planning and programming of geophysical activities in the Board, acquisition, maintenance and repair of geophysical equipment, organizing geophysical training programmes and guidance in special geophysical field survey etc. In the year 2001-2002 the Central Geophysical Cell undertook the following activities:

a. Planning & Programming of Geophysical surveys in CGWB.

b. Co-ordinations of Geophysical Survey and related activities of the regions.

c. Inspection/maintenance of Geophysical equipments including loggers.

e. Assisted the R.D (HP) in preparing the lecture on geophysical methods for Roof Top Rainwater Harvesting.

f. Issue necessary guidelines in the development of dedicated software on geophysics for NDC.

ii. Regional Directorates

Details of geophysical surveys and geophysical borehole logging carried out by the regions are as follows:

**REGION-WISE PROGRESS DURING (2001-2002) UPTO NOVEMBER, 2001**

<table>
<thead>
<tr>
<th>REGIONS</th>
<th>TARGET</th>
<th>COVERAGE RESISTIVITY</th>
<th>LOGGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>NWHR</td>
<td>30VES</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>NWR</td>
<td>150VES</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>WR</td>
<td>95VES +10 LKM</td>
<td>21 + 1.87 LKm</td>
<td>13</td>
</tr>
<tr>
<td>WCR</td>
<td></td>
<td>2</td>
<td>31</td>
</tr>
<tr>
<td>NCR</td>
<td>25DEEP+75 +10.25LKM</td>
<td>47 +4.0LKm</td>
<td>14</td>
</tr>
<tr>
<td>NCCR</td>
<td>70VES</td>
<td>73 +14Profile</td>
<td>3</td>
</tr>
<tr>
<td>CR</td>
<td>150VES+NEED BASED</td>
<td>55 +5 VLF</td>
<td>15</td>
</tr>
<tr>
<td>NR</td>
<td>150DEEP</td>
<td>55 +6.21Lkm</td>
<td>10</td>
</tr>
<tr>
<td>MER</td>
<td>100VES</td>
<td>57</td>
<td>5</td>
</tr>
<tr>
<td>ER</td>
<td>150VES</td>
<td>86 + 4GRP</td>
<td>Nil</td>
</tr>
<tr>
<td>NER</td>
<td>NEED BASED</td>
<td>41 + 1 Profile</td>
<td>7</td>
</tr>
<tr>
<td>SER</td>
<td>NEED BASED</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>SR</td>
<td>150VES</td>
<td>87 +13.55Lkm</td>
<td>5</td>
</tr>
<tr>
<td>SWR</td>
<td>150VES</td>
<td>119 + 4VLF</td>
<td>1</td>
</tr>
<tr>
<td>SECR</td>
<td>150VES</td>
<td>146 +44.8Lkm</td>
<td>9</td>
</tr>
<tr>
<td>KR</td>
<td>150VES</td>
<td>31 + 0.3Lkm</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>813VES</td>
<td>141</td>
<td></td>
</tr>
</tbody>
</table>
SHORT TERM WATER SUPPLY INVESTIGATIONS

These investigations are carried out for locating sites for ground water structures and designing of tube wells and water lifting devices to provide a dependable water supply system in rural and urban areas, Railway and industrial establishments, with priority being given to Defence Organizations. During 2000-2001, 192 short term investigations were carried out. During 2001-2002, (upto January, 2002) 129 such investigations have been conducted.

DATA STORAGE AND RETRIEVAL

The Central Ground Water Board is collecting voluminous data from on various aspects of ground water investigation, development and management. The task of design, analysis and development of software for organization, management and analysis of the data generated by the Central Ground Water Board is being under taken by the Data Storage and Retrieval Directorate of the Board. The data of ground water level from the National Hydrograph Network Stations has been computerized. Personal computers along with MS office software have been provided at Head Quarter, Faridabad, Regional, Divisional and Unit offices of the Board. NICNET connection has also been provided at CHQ, Faridabad and all the Regional Offices.

During 2001-2002, design of a Management Information System (MIS) has been initiated and it is proposed to complete the financial management Module of MIS.

MATHEMATICAL MODELLING STUDIES

The Central Ground Water Board has conducted various studies on ground water modeling. In four Irrigation Commands mathematical modeling has been initiated for planning the optimal ground water development in Conjunction with surface water. As a part of Conjunctive Use Studies, mathematical modelling has been completed in Kosi Command, Bihar IGNP stage - II, Rajasthan. Mathematical modeling work in Nagarjuna Sagar Irrigation Command, Andhra Pradesh and Gandak irrigation Command, Bihar is under progress and at its final stage. The preparation of data and conceptualization of model and data entry of MODFLOW package (software) have been completed for ground water. Simulation studies in Gandak Command, Bihar and Nagarjuna Sagar Irrigation Command, Andhra Pradesh are under progress.

BHUJAL NEWS

The Board brings out a quarterly journal, "BHUJAL NEWS". A number of scientific papers on relevant matters were contributed by scientists of Central Ground Water Board and from other organisations. The journal contains various technical notes, news items, list of published papers and unpublished reports of the Board etc. The journal is being dispatched to Central and State Agencies, State/ Public Sector, Undertakings and academic institutions. During 2001-2002, till November, 2001, the Bhujal News issue
APPLICATION OF REMOTE SENSING AND G.I.S. TECHNIQUES TO GROUND WATER STUDIES

Remote Sensing is a powerful and effective tool for critically evaluating land resource information received through different satellites and use that information in mapping and monitoring natural resources of the earth. The science of remote sensing is generally applied to study satellite data which are available for vast areas for multiple time periods and provide a synoptic view to interpret large scale phenomena. Now a days, Space Satellite data is being utilised in various fields like urban development, meteorology, defence, mineral exploration, snow and reservoir studies, geomorphologic and land resource mapping etc. The role of remote sensing in the field of hydrogeological studies is very important, but it is not well understood by the people as it is generally thought that ground water are underground resources and remote sensing data give information about surface features. Though, ground water resources are resting underground, there are many indirect imprints about their availability are present as surface features in certain area which if picked up, can give valuable clues for silting ground water potential zones. Similarly, there are many ground water management activities like identification of waterlogging, soil salinity, pollution, impact of water stress on vegetation in over-developed areas, silting and monitoring of recharge structures, delineation of watershed and roof top areas for recharge through rain water harvesting, silting of landfill sites and industrial zones, laying of network of drainage and canal systems etc. in which satellite data can be very vital.

During the year 2001-2002, the regional offices of the Central Ground Water Board have taken up remote sensing studies for ground water targeting, preparation of hydrogeomorphological maps, salinity identification and in ground water management studies. The data interpreted through the satellite images is very vital information which is being utilized to narrow down the targeting zones. Apart from this, the Central Headquarters has provided image processing software to a few regional offices so that digital satellite data can be utilised for interpretation, and can be used later for multi-date studies of the same areas. The scientists of regional offices were also trained in hands on working on the image processing software. A three day Appreciation Course in Application of Remote Sensing in Ground Water Studies from 21st November to 23rd November, 2001 was also conducted at the CGWB, New Delhi office. Twelve scientists from regional offices of the Board attended the course, in which lectures were given and practical demonstrations on remote sensing and image processing techniques were made.

GROUND WATER POLLUTION STUDIES

Indiscriminate disposal of urban and industrial wastes, excess application of fertilisers cause infiltration of toxic elements in the aquifer.
system and produced contamination. Studies to assess nature of pollution, sources of pollution and measures to control ground water pollution have been given a much higher priority during the IXth Plan. During 2001-2002, 21 pollution studies were taken up.

During 2001-2002 (up to January, 2002) ground water pollution studies have been initiated in the following areas -Nawashahar & Hoshiarpur(Punjab), Parwanoo (H.P), Ambala & Panchkula (Haryana), Osmanabad, Ballarpur paper industry, Zarud&Warud area (Maharashtra), Khalidabad Industrial Area, Basti district & Dewa block of Barabanki district (U.P.), Margherita Coal field area(Assam), Boden block, Nuapara district (Orissa), Hyderabad Metropolitan Area(A.P.), Manali area of North Chennai (T.N.) and around Villappisala, Trivandrum district (Kerala) . Studies have also been undertaken in the fluoride affected area of Nagaon district, Assam. Samples were collected and analyzed which indicate high concentration of fluoride in Ground Water.

**URBAN HYDROGEOLOGICAL STUDIES**

Special studies on urban hydrogeology are being undertaken with the objective of having sustainable water supply to the major cities affected by water supply and pollution problems. During the course of studies, it has been proposed to look into various development in such urban centres so as to make ground water based supplies to these cities sustainable for 21st century. During 2001-2002, 15 studies were initiated in the cities of Udhampur(J&K), Shimla (H.P.), Patiala(Punjab), Gwalior City (M.P.), Raipur City (Chhattisgarh), Kolhapur(Maharashtra), Allahabad (U.P.), Gaya City (Bihar), Calcutta Municipal Corporation area (W.B.), Jorhat (Assam), Balasore town (Orissa), Eluru & Warangal (A.P.), Mysore City (Karnataka) and Chennai City (T.N.). Pre-monsoon work, monitoring work with data analysis, preparation of hydrogeological maps, collection of water samples have been completed for above studies.

**MAPPING OF WATER LOGGED AREA AND FEASIBILITY STUDY FOR ANTI WATER LOGGING MEASURES**

During 2001-2002, the Central Ground Water Board proposed to take up special studies aimed at delineating the water logged and feasibility study for anti water logging measures. 6 out of 9 studies in Ranbir Canal Command Area, R..S. Pura (J&K), Faizabad & Barabanki(U.P.), Kosi Command area (Bihar), East Godavari (A.P.) and Left Bank Canal Command of Malprabha basin of Belgam distt. (Karnataka) have been undertaken. Pre-monsoon work, collection of data, key well monitoring and collection of water samples have been initiated.

**SEA WATER INGRESS STUDIES**

Project studies envisaging mapping of sea water ingress through multidisciplinary approach including geophysical, hydrochemical and remote sensing studies were proposed to be carried out. Feasibility of appropriate measures to arrest the ingress through controlled pumpage and artificial
Recharge were proposed to be evaluated to push back the sea water/fresh water interface. Feasibility of exploiting deeper aquifers in coastal areas were also studied. 2 studies have been taken up during 2001-2002 in East Godavari Coastal area and saline water ingress in phreatic aquifers along tidal back water of South Kerala. The studies are under progress.

**ISOTOPIC STUDIES**

During 2001-2002, 3 studies were undertaken in the Ganga Basin, South Chennai (TN) and Delhi. Under the Ganga Basin study the data of Environmental Isotopes in water samples of Uttaranchal and Uttar Pradesh were analysed at BARC. The available data suggest that the ground water from deep zones (740 metre below ground level) is quite old in age, whereas the ground water from shallow depths or dug well zones is being recycled through recharge from rains in hills as well as in plains. The final report is still awaited from BARC, Trombay.

**ESTIMATION OF GROUND WATER RESOURCE BASED ON GROUNDWATER ESTIMATION COMMITTEE-1997 (GEC-1997) METHODOLOGY**

Following guidelines of the National Water Policy, the ground water resource estimation is being revised based on GEC'97 methodology. Meetings are being held with State Government Organizations to make joint assessment of ground water resources. The States of Uttar Pradesh, Tamil Nadu, and Kerala have completed the exercise for the entire state. The states of Gujarat and Rajasthan have also attempted the exercise for the entire state. The states of Maharashtra and Orissa are in the final stages of completion of the exercise. It is expected that the exercise of block-wise re-estimation of ground water resource potential for the whole country will be completed by the end of the IX plan. A committee has also been set up to look into the present methodology for ground water resource assessment in hard rock terrain conditions.

Present estimation of ground water resource of the entire country is based on ‘GEC’84’. The ground water resources and their stage of development (state-wise) as on 01.04.1998 is enclosed as Annexure - B, and the categorization of blocks is given as Annexure - C.

**CONJUNCTIVE USE OF SURFACE AND GROUND WATER**

Draft report of Indira Gandhi Nahar Pariyojana (IGNP) stage-II, Rajasthan and Kosi Command Area, Bihar was submitted for scrutinization and final report is under preparation. The report of the Nagarjuna Sagar, Irrigation Command, Andhra Pradesh is under finalization. The draft report of the Gandak Command Area is under compilation.

**EXHIBITIONS ORGANISED BY CENTRAL GROUND WATER BOARD**

Working models of the Hydrological cycle, Conjunctive Use of Surface and Ground Water, Artificial Recharge Studies carried out in JNU, New Delhi, Rotary Drilling Rig, Photos
of drilling activities, Panels (4 no. of Size 2’x6’) showing activities and achievements of CGWB, Translite showing various methods of Artificial Recharge, Translite of Roof Top Rain Water Harvesting Techniques and various Publications released by the CGWB were displayed to create awareness on various aspects of ground water development and management. In addition to this on the spot analysis of water to check its suitability for drinking & domestic use, testing kit and treatment techniques for high fluoride were also displayed through the R & D lab of CHQ, Faridabad.

CGWB was successful in attracting the masses and creating awareness among the farmers, school/ college students, Agriculture scientists, general public and other dignitaries. The general Public took keen interest in Roof Top Rain Water Harvesting Techniques for artificial recharge, water analysis and treatment techniques. Brochures on Activities and Achievements of CGWB, attributes of Ground Water, Roof Top Rain Water harvesting Techniques and other brochures were distributed. Various publications of CGWB were in great demand among the public.

The following functions/ exhibitions were organised/ participated in by the Board during 2001-2002 (up to November, 2001):

**Shimla Knowledge.Com 2001**

Central Ground Water Board participated the exhibition SHIMLA KNOWLEDGE.Com 2001 Organized during 7th to 9th June, 2001 at Shimla (Himachal Pradesh). The thrust areas in the Exhibition were Ground Water, Integrated Development of River banks, Rain Water Harvesting, Pollution of Rivers, Desalination Technologies and other water related subjects.

Other departments under Ministry of Water Resources also participated in the exhibition. The Central Ground Water Board displayed various models, Panels and Translites etc. and was successful in creating awareness on various aspects of Ground Water among the general public, University students, eminent scientists and other persons visited the exhibition. The Chief Minister, Government of Himachal Pradesh also visited the pavilion of Central Ground Water Board and was highly appreciative.

**India International Trade Fair- 2001**

The Central Ground Water Board participated in the INDIA INTERNATIONAL TRADE FAIR(IITF)-2001 held from 14th to 27th November, 2001 at Pragati Maidan, New Delhi. The Central Ground Water Board pavilion was quite successful in creating awareness about various aspects of ground water and related issues among the general public, students and the persons visiting the Technology Trade Pavillion in IITF-2001.

**VIGILANCE ACTIVITIES**

36 cases of complaints were brought forward from the last year and 16 complaint cases were received during 2000-2001, (upto 30.11.2001). Thus a total 52 complaint cases were on the record. Out of these 5
complaints were disposed off and 24 cases were taken up as disciplinary proceedings. Therefore, 23 complaint cases have been carried forward w.e.f. 1.12.2001.

32 cases of disciplinary proceedings were brought forward from last year. 24 cases of disciplinary proceedings were received during the year. Thus a total 56 disciplinary cases were on the record. Out of these 29 cases of disciplinary proceedings were finalized upto 30.11.2001 and 27 cases have been carried forward w.e.f. 1.12.2001 to next year (including Group A & B Officers).

**PROGRESSIVE USE OF HINDI**

- Letters received in Hindi are being replied in Hindi in compliance of official language Act 1963 (Section 3 (3)).

- Meetings of official language implementation committee are being conducted regularly.

- Quarterly progressive reports are being regularly sent to Hindi Section, Ministry of Water Resources, town official language implementation committee, Faridabad and regional implementation office, Ghaziabad.

- Hindi week was organised from 24.9.2001 to 28.9.2001. In this week various competitions were held and awards were given.

- Town official implementation committee, Faridabad conducted various training programs. Typist and stenographers are being sent for training.

- Incentive schemes for doing work in Hindi is introduced in the office, in which 10 officials were given cash awards.

- All Proforma of daily use are translated and sent to subordinate offices.

- Members of drafting and evidence sub committee of Parliament on official language inspected the 16 offices of town official language implementation committee on 22.5.2001 including Central Ground Water Board.

- Shri Jaswant Singh, Research Officer, Official language Department, Ministry of Home Affairs, Regional Implementation Office (North Zone), Gaziabad inspected Central Ground Water Board on 24.5.2001.

**REDRESSAL OF GRIEVANCES**

During the 2001-2002 the status of redressal of grievances is as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grievances pending as</td>
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</tr>
<tr>
<td>on 01.04.2001</td>
<td></td>
</tr>
<tr>
<td>Grievances received</td>
<td>6</td>
</tr>
<tr>
<td>during the year</td>
<td></td>
</tr>
<tr>
<td>Grievances disposed off</td>
<td></td>
</tr>
<tr>
<td>(upto November, 2001)</td>
<td></td>
</tr>
<tr>
<td>In favour of the applicant</td>
<td>4</td>
</tr>
<tr>
<td>Not in favour of the applicant</td>
<td>4</td>
</tr>
<tr>
<td>Grievances pending as on 31.12.2001</td>
<td>3</td>
</tr>
</tbody>
</table>
**Annexure A**

**LIST OF RECHARGE PROJECTS APPROVED UNDER THE CENTRAL SECTOR SCHEME IN THE YEAR 2001-02 TILL NOVEMBER, 2001**

<table>
<thead>
<tr>
<th>S.No</th>
<th>State</th>
<th>Name of the Scheme</th>
<th>Estimated cost of the scheme for which it is approved Rs: in Lakhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bihar</td>
<td>Project proposal for roof top rain water harvesting for engineers line cantonment area, Ranchi, Bihar</td>
<td>6.60</td>
</tr>
<tr>
<td>2</td>
<td>Chandigarh</td>
<td>Scheme for roof top rain water harvesting at Bhu jal bhawan Chandigarh</td>
<td>3.74</td>
</tr>
<tr>
<td>3</td>
<td>Chandigarh</td>
<td>Scheme for Artificial recharge to ground water at office of Chandigarh housing board in Sector 9, Chandigarh.</td>
<td>11.47</td>
</tr>
<tr>
<td>4</td>
<td>Chandigarh</td>
<td>Scheme for Rain water harvesting at DAV School in Sector 8, Chandigarh.</td>
<td>9.41</td>
</tr>
<tr>
<td>5</td>
<td>Chandigarh</td>
<td>Scheme for Artificial recharge to ground water at Technical Teachers Training institute, Sector 26, Chandigarh.</td>
<td>12.13</td>
</tr>
<tr>
<td>6</td>
<td>Chandigarh</td>
<td>Scheme for utilising surplus water monsoon runoff for sector 26,27,19,30,20, Chandigarh.</td>
<td>10.38</td>
</tr>
<tr>
<td>7</td>
<td>Delhi</td>
<td>Scheme for Artificial recharge to ground water at deen dayal upadhyay hospital, New delhi.</td>
<td>4.55</td>
</tr>
<tr>
<td>8</td>
<td>Delhi</td>
<td>Artificial recharge scheme in park of D-Block, Vasant Vihar, New Delhi.</td>
<td>5.60</td>
</tr>
<tr>
<td>9</td>
<td>Delhi</td>
<td>Artificial recharge to ground water at sultangarhi tomb, New Delhi.</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>State</td>
<td>Project Description</td>
<td>Amount</td>
</tr>
<tr>
<td>---</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>10</td>
<td>Delhi</td>
<td>Artificial recharge scheme to ground water at Safdargunj Hospital, New Delhi.</td>
<td>8.23</td>
</tr>
<tr>
<td>11</td>
<td>Delhi</td>
<td>Artificial recharge to ground water to Ryan International School, Sector -C, Pocket -8, Vasnt Kunj, New Delhi.</td>
<td>2.45</td>
</tr>
<tr>
<td>12</td>
<td>Delhi</td>
<td>Scheme for Artificial recharge to ground water at DTC Central Workshop-II, Okhla, New Delhi.</td>
<td>6.80</td>
</tr>
<tr>
<td>13</td>
<td>Delhi</td>
<td>Scheme for artificial recharge to ground water at 5, Janpath Road, New Delhi.</td>
<td>0.60</td>
</tr>
<tr>
<td>14</td>
<td>Delhi</td>
<td>Scheme for artificial recharge to ground water at group housing for abhiyan CGHS ltd. Plot - 15 , Sector- 12, Dwarka, New Delhi.</td>
<td>0.85</td>
</tr>
<tr>
<td>15</td>
<td>Haryana</td>
<td>Artificial recharge scheme at village Gwal Pahari district Gurgaon, Haryana.</td>
<td>6.35</td>
</tr>
<tr>
<td>16</td>
<td>Jammu</td>
<td>Rooftop rainwater harvesting for mata vaishno devi shrine Udhampur district, J&amp;K state</td>
<td>20.00</td>
</tr>
<tr>
<td>17</td>
<td>Maharashtra</td>
<td>Roof top rain water harvesting at Panchanyat Samiti Office premises, Warud District Amravati, Maharashtra.</td>
<td>0.80</td>
</tr>
<tr>
<td>18</td>
<td>Maharashtra</td>
<td>Roof top rain water harvesting in KITS campus, Ramtek, Maharashtra</td>
<td>1.50</td>
</tr>
<tr>
<td>19</td>
<td>Nagaland</td>
<td>Roof top rain water harvesting and storage in Rengma Area in Nagaland.</td>
<td>10.96</td>
</tr>
<tr>
<td>20</td>
<td>Orissa</td>
<td>Recharge scheme for Creek Irrigation projects in Bhadrak district, Orissa in the parts of Bhadrak, Kendrapara and Puri districts of Orissa.</td>
<td>592.00</td>
</tr>
<tr>
<td>21</td>
<td>Orissa</td>
<td>Scheme of rain water harvesting/roof top rain water harvesting in Raj Bhawan Premises, Bhubhaneshwar, Orissa.</td>
<td>13.50</td>
</tr>
<tr>
<td>No.</td>
<td>State</td>
<td>Project Description</td>
<td>Cost</td>
</tr>
<tr>
<td>-----</td>
<td>------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>22</td>
<td>Orissa</td>
<td>Arresting salinity ingress and ground water recharge in Chandbali and Basudeypur blocks of Bhadrak district of Orissa.</td>
<td>647.00</td>
</tr>
<tr>
<td>23</td>
<td>Rajasthan</td>
<td>Concept plan for project design and implementation of Roof Top/Pavement Rain water Run-off harvesting structures at officers training school (OTS, Nehru Bhawan), Jaipur, Rajasthan.</td>
<td>11.11</td>
</tr>
<tr>
<td>24</td>
<td>Rajasthan</td>
<td>Artificial recharge at College of Technology and Engineering, (CTAE), Udiapur, Rajasthan.</td>
<td>4.50</td>
</tr>
<tr>
<td>25</td>
<td>Tamil Nadu</td>
<td>Scheme for artificial recharge to ground water in Central Leather Research Institute, Chennai, Tamil Nadu.</td>
<td>8.97</td>
</tr>
<tr>
<td>26</td>
<td>West Bengal</td>
<td>Roof top rain water harvesting at Baishnabghatapatuli office campus, Calcutta.</td>
<td>10.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>1416.15</td>
</tr>
</tbody>
</table>
## GROUND WATER RESOURCE OF INDIA [As on 01.04.98]

<table>
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<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
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</thead>
<tbody>
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<td>States</td>
<td>MHaM/Yr</td>
<td>MHaM/Yr</td>
<td>MHaM/Yr</td>
<td>MHaM/Yr</td>
<td>MHaM/Yr</td>
<td>MHaM/Yr</td>
<td>MHaM/Yr</td>
<td>%</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>3.52909</td>
<td>0.52936</td>
<td>2.99973</td>
<td>2.69975</td>
<td>1.11863</td>
<td>0.78304</td>
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<td>0.02158</td>
<td>0.12227</td>
<td>0.11005</td>
<td>-</td>
<td>-</td>
<td>0.12227</td>
<td>-</td>
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<td>Assam</td>
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<td>0.33718</td>
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<td>1.71962</td>
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<td>0.14249</td>
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<td>0.82527</td>
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<td>Chattisgarh</td>
<td>1.60705</td>
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<td>1.36599</td>
<td>1.22939</td>
<td>0.10925</td>
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<td>Goa</td>
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<td>Himachal Pradesh</td>
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<td>Jammu &amp; Kashmir</td>
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<td>Meghalaya</td>
<td>Mizoram</td>
<td>Nagaland</td>
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<td>0.04730</td>
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<td>0.24129</td>
<td>Neg.</td>
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<td>0.26810</td>
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<tr>
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## ANNEXURE -C

**CATEGORISATION OF BLOCKS/MANDALS/TALUKS/WATERSHEDS AS OVER EXPLOITED AND DARK ON ALL INDIA BASIS (As on 01.04.1998)**

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**Union Territories**

1. Andaman & Nicobar
2. Chandigarh
3. Dadar & Nagar Haveli
4. Daman & Diu
5. NCT Delhi
6. Lakshdweep
7. Pondicherry

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**Grand Total**

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Note: Andhra Pradesh - Mandal, Gujarat, Karnataka, Maharashtra - Taluks/ Tehsils
HIGHLIGHTS

● **NCCBM, Ballabhgarh, Haryana**

CSMRS is associated with National Council for Cement and Building Materials (NCCBM) in providing technical assistance in setting up of soil mechanics laboratories at Bhuj and Morbi in Gujarat and training of staff in soil mechanics laboratory and field testing in connection with technical audit and quality assurance programme for earthquake rehabilitation and reconstruction project of Gujarat State Disaster Management Agency (GSDMA).

● **Tehri Dam Project, Tehri, Uttarakhand – Quality Assurance Programme**

A memorandum of understanding (MoU) was signed between CSMRS and Tehri Hydro Development Corporation (THDC) Ltd. regarding participation of CSMRS in the Quality Assurance Programme of civil works for Dam & Spillway for Tehri Dam Project, Uttarakhand. Under this programme, officials from the research station visit the project site regularly and witness the tests on soil and filter materials etc. being carried out by THDC quality control officials. The purpose is to ensure that the design standards laid for these materials should be met with.
The Central Soil and Materials Research Station (CSMRS), New Delhi is a premier organization in the country dealing with the field explorations, laboratory investigations, basic and applied research in the field of Geomechanics and Construction Materials, concerning river valley projects, construction, safety evaluation of existing Dams, etc. The Research Station primarily functions as an Adviser and Consultant to the various Departments of Government of India, State Governments and Government of India Undertakings/Enterprises. The Research Station has been constantly updating its facilities and training its staff for the last three decades and has acquired some unique capabilities in the country in the field of Geotechnical Engineering and Construction Materials Characterisation. The sphere of activities of the Research Station is covered under the disciplines of:

- Soil Mechanics and Foundation Engineering including Soil Dynamics, Soil Chemistry, Geotextiles and Rockfill Technology.
- Rock Mechanics including Instrumentation, Engineering Geophysics, Grout Technology and Drilling Technology for sub-surface characterisation.
- Construction Materials and Concrete Technology including Chemistry of Concrete.

The Research Station has been involved in the safety evaluation of existing hydraulic structures and construction quality control of various civil engineering structures pertaining to river valley projects. Besides contribution to almost all the major river valley projects spread all over the country, the CSMRS has also rendered consultancy to projects in the neighbouring and the middle-east countries like Burma, Srilanka, Afghanistan, Bangladesh, Iraq, Algeria, in the past, and is presently involved in major River valley projects investigations all over the country, and also a limited number of projects in Bhutan & Nepal. CSMRS has also imparted training to personnel from within the country/foreign countries in the fields of Geomechanics and Construction Materials Characterization for Civil Engineering Structures connected with river valley projects.

ACTIVITIES DURING THE YEAR

Investigation for as many as 45 river valley projects and other civil engineering structures have been handled successfully with particular reference to foundation and borrow area materials characterization, for which a large number of laboratory tests were conducted by utilizing the upgraded testing facilities and specialization acquired through various United Nations Development Programme (UNDP) assisted programmes. Based on in-depth analysis of these test results, detailed Technical
Reports were finalized and forwarded to the respective project authorities. In addition, the following plan/self sponsored research schemes have been taken up by different divisions:

**ONGOING PLAN SCHEMES**

- **Establishment of Geosynthetics Division**

Under this scheme, Electronic Tensile Testing Machine (10 Tonnes) was put under the annual service contract with the supplier. The electronic control and display panels got repaired and the calibration of the equipment was carried out. Few steel fibers received from Tala Hydro Electric Project, Bhutan were tested for determining the tensile strength of these fibers.

- **Establishment of Research & Testing Facilities for Rock Fill**

Rockfill materials collected from 6 projects have been subjected to Large Size Triaxial and Odometer tests as to arrive at various mechanical properties of these materials.

- **Identification and Characterization of Dispersive Soils**

A large number of borrow area soil samples collected from four different river valley projects were subjected to soil dispersivity identification tests.

- **Dynamic Characterization of Soils and Materials**

A PC based data acquisition system for Geonor cyclic triaxial test equipment has been acquired and installed.

- **Facilities for Insitu Sampling in Soil**

In soft clays and loose sand, the sample slips out of the tube while lifting the open drive samplers. In the recent years, these problems have been successfully tackled by introduction of hydraulically operated thin wall piston tube sampler and Bishop sand samplers with area ratio less than 5%. Quotations have been called for the procurement of these samplers.

- **Facilities for Diagnostic Investigations of Existing Dams**

Under the Scheme, a CSMRS field party visited Wanakbori Weir Site, Gujarat for assessing the general quality/condition of the masonry weir and conducted non-destructive tests (NDT) using Ultrasonic Pulse Velocity technique on the existing stone masonry of the Wanakbori Weir. Besides CSMRS also proposed standard masonry test block for comparison purposes.

- **New Construction Techniques**

Under this research scheme in order to achieve high strength/high performance, concrete cubes of 100 mm x 100 mm x 100 mm size were cast for 1:2.5 (coarse aggregate: fine aggregate) mix of flyash concrete by replacing cement with 0,20,25,30,35,40&50% of flyash by weight and using water/cementitious material ratio of 0.30, 0.35 and 0.40 along with superplasticizer so as to maintain the same workability.
A total of 198 cubes were cast and tested for their compressive strength, pulse velocity and density at 7, 28 and 90 days. The results have been evaluated and compiled. The analysis of tests results is under progress.

- **Advance Mineralogy and Chemistry of Materials of Construction:**

The following equipments have been purchased under the scheme:

- Ion meter and Ion selective electrode
- Microwave Digestion System
- Total water Quality Equipment
- Ultra Violet Visible Spectrophotometer
- Flame Photometer
- Miscellaneous equipments

With the equipment procured so far, it has been possible to make advancement in chemical investigations in the field as well as in the laboratory, pertaining to areas mentioned above. Development of a Bureau of Indian Standard (BIS) method for determination of Chloride in hardened mortar and significant use of Ion meter in the determination of Chloride content in admixtures are the important achievements.

- **Modernization of Drilling and Sampling Facilities**

After completing one Project of Delhi Development Authority, at Dhirpur, New Delhi for Field drilling for Geotechnical Investigations, another Project has been taken up at Mukherjee Nagar, New Delhi. 8 Boreholes of 40 m depth each are to be drilled. The work is under progress. SPT (Standard Penetration) and UD (Un-disturbed) Soil Sampling Tests are also being done simultaneously at the required depths. Also under the above scheme the following have been purchased:-

- 2 new Skid mounted drilling machines and 2 water pumps, which have been received in CSMRS, are being field-tested in this very Project for their acceptability.
- Another Drill Machine, which has also been received in CSMRS, for the purpose of drilling in drifts for conducting in-situ stress measurement tests. This machine shall be tested in CSMRS.

- **Modernisation of Rock Mechanics Laboratory Testing Facilities**

Under this the “Upgradation of stiff-testing machine” is being carried out. The literature review is in progress; also, the process of finalizing the new equipment to be procured, and the preparation of specifications of the identified equipment (measurement of compression and shear wave velocity with transducers of different frequencies) is in progress.

- **Numerical Modelling/Analysis for Geotechnical Problems**

Under the above scheme, the following has been achieved :-
— Updated Universal Distinct Element Code (UDEC) software from 2.1 to 3.1 has been received.

— Finite Element Method (FEM) Studies of Lakhwar Dam Project are in progress.

— One paper on “Evaluation of Deformation Around a Tunnel by Using FEM, Finite Element Boundary Element Method (FEBEM), UDEC, Universal Distinct Element Code – Boundary Element (UDEC-BE) and Close Form Solution (CFS)” has been published.

— Guidance has been given to Engineers from NHPC for the application of UDEC for Dam Foundation problem.

● Geotechnical Instrumentation Development

— Under the above scheme, three porous tube type Piezometers have been fabricated by CSMRS. Further action for fabrication of more such instruments is also in hand. Action is also being taken for installing the available Piezometers within CSMRS complex for monitoring the ground water table in view of implementation of “Rain Water Harvesting” in CSMRS complex.

— 3-D Crack Monitors for monitoring crack deformation in three directions simultaneously have been installed successfully at various projects. Now it is planned to upgrade them to incorporate the measuring facility of angular movements in addition to their existing features.

● Geotechnical Performance Monitoring

— Geotechnical Performance Monitoring of Geotechnical instrumentation for Crack and Rock Deformation in the Power House Cavern and the Crown of the Machine Hall of Sardar Sarovar Project, Gujarat is being carried out regularly. The Interim Analysis Report has been sent to the Project authorities. A CSMRS field party carried out pullout test in the Power House cavern on 11 Nos. of rock bolts and four numbers of cable anchors. A report is under finalization.

— Geotechnical Performance Monitoring for Crack Deformation of Dam & Power House of Rihand Dam Project, Uttar Pradesh is being carried out regularly. The Interim Analysis Report has been sent to the Project authorities.

SELF SPONSORED RESEARCH SCHEMES

● Prediction of Consolidation Characteristics of Fine Grained Soils

Soils undergo strains on application of stress, which are not proportional to the applied stress. It is therefore necessary to study the stress strain characteristics of the soil in foundation of structures in order to understand the settlement of structures and to predict and make provision for the settlement which may occur during its
lifetime. One dimensional consolidation tests on 8 soil samples pertaining to different projects were carried out using computer controlled consolidometer on cohesive soils having clay content between 20% to 50% and plasticity index between 10 to 30 to arrive at the stress strain relation.

- **Effect of pH on Physical and Engineering Properties of Soils**

Under this scheme, a comprehensive literature survey was done during the preceding financial year. Three soil samples were collected from Indore, Chandigarh and Nagpur. Samples collected from Indore were treated with sulphuric acid and nitric acid. The sample was subjected to various tests viz. Mechanical analysis, Atterberg limits, Shrinkage limits, Strength parameters etc., before and after acid treatment, to study the effect of pH on the physical and engineering properties. Based on the experimental data, a technical paper titled “Effect of Acid Rain on Index and Strength Properties of Soil” was published in the proceedings of Indian Geotechnical Conference (IGC)-2000 held at Mumbai from 13-15 December, 2000.

Similarly data of acid treated soil of low and high plasticity was compared. Based on the experimental data and study, a technical paper titled “Detrimental Effect of Air Pollution on the Engineering Properties of Soil” was published in the proceeding of Indian Geotechnical Conference (IGC)-2001, being held at Indore from 14-16 December, 2001.

- **Use of Fly Ash as a Filter Material for Retention of various Toxic Cations**

After a comprehensive literature survey, few flyash samples and samples of industrial effluents were collected to study the retention capacity of flyash. These samples were subjected to chemical analysis to know the initial composition. The industrial effluents were also analysed to identify the commonly found toxic cations. Standard solutions of various commonly found toxic cations were prepared to study the adsorption capacity of flyash. Some experimental work was done to study the adsorption capacity of flyash from Badarpur Thermal Power Station, New Delhi.

Experiments were conducted in the laboratory to study the effect of particle size on retention of copper, chromium and cadmium using flyash from Dadri Thermal Power Station, Uttar Pradesh.

- **Development of Advanced Chemical Method for Characterisation of Aggregates**

A series of tests was conducted, by chemical method for a reactive period of 12, 24, 48, 72, 96 & 120 hrs on aggregate from 10 projects from different parts of the country. The experimental work is completed and interpretation of results is in progress.

- **Use of flyash for Controlling Corrosion in Reinforced Concrete**

Under this scheme a total of 216 prisms of flyash concrete of 75 x 75 x 300mm size were made.
cast with cement content of 350 kg/m³, 400 kg/m³ and 450 kg/m³, and water/cement ratio of 0.45 and replacement of cement with 0, 10, 15 and 20% of flyash by weight of cement and were tested at their ages of 18, 19, 20, 21, 22 and 23 months for corrosion detection using half cell potentiometer.

Also the analysis of test results of prism bars is being carried out for assessing the correlation between half-cell potential (mv) (corrosion) and period of immersion in 5% in NaCl (Sodium Chloride) solution.

● Correlation of Ultrasonic Pulse Velocity and Strength Characteristics of Concrete

A total of 198 concrete cubes (size 100 mm) were cast with 1:2.5 ratio of coarse and fine aggregate using various percentages of flyash with cement at different water/cementitious ratios. The cubes were tested at 7, 28 and 90 days by Ultrasonic Pulse Velocity Method and by Compression Testing Machine for determining strength characteristics. The analysis of test results and correlation between pulse velocity and compressive strength is being done.

● Deformability of Rock Mass

The data from different projects was analysed. Three nos. of technical research papers were published and equal no. of papers are under preparation.

An award was received from the Indian Geotechnical Society for the best paper - Rock Mechanics for the year 1999 & 2000. The paper was entitled “Characterisation of Rock Mass at Kalpong H.E. Project (Andamans)”. 

● Geotechnical Performance Monitoring of Hostel Building of CSMRS

Based on the foundation investigations carried out by CSMRS, expected settlements were calculated and the same were incorporated in the design. To compare the evaluated settlement with actual settlement, 3 nos. of single position borehole rod extensometers have been installed in the foundation.

CONSULTANCY WORKS

A large number of consultancy works pertaining to river valley projects and connected civil engineering structures were handled during the reporting period.

Some of the important projects handled are briefed below :-

● Pancheshwar Multipurpose Project, Joint Project Office-Pancheshwar Investigation (JPO-PI), India-Nepal

The Pancheshwar Multi-purpose Project India/Nepal is envisaged for harnessing the water resources of the river Mahakali, a border river between India and Nepal. The proposal consists of constructing a 315 m high Rockfill Dam with impervious clay core for generation of electricity and constructing a re-regulating structure downstream for irrigation. Two sites, Rupaligargh and Purnagiri have been investigated for this purpose. The quantity of
impervious clay core materials needed is to the tune of 10 million cubic meter (approximately).

After entering into an agreement with the joint project office, reconnaissance survey for borrow areas for impervious clay material was taken up by a CSMRS field party and Project Engineers by traversing borrow areas viz. Chamdewal, Dundai, Harkhera, Jakh, Malli Jhanjari and Sirikot – Ganjna hill slopes. 32 soil samples collected from these borrow areas were graded. The borrow materials exhibit very good compaction density and good shear strength. The consensus arrived at based on the four special dispersivity identification tests indicate that the tested soil samples can be categorized as non-dispersive. These materials in general are suitable for the construction of impervious core of the proposed dam. Based on the in-depth analysis of the laboratory investigations a detailed report has been submitted to the Project Authorities.

In-situ stress measurement in deep drill hole (DDH) - 6 have been completed, where 7 Hydrofracturing tests and 4 impression test have been completed. Testing at deep drill hole (DDH) -1 is under progress on the left bank of river Mahakali (Nepal). In-situ stress measurement in deep drill hole has been proposed for 3 more drill holes.

- **Mahanadi Godawari Link Canal Project (ORISSA)**

The Mahanadi Godawari Link Project envisages transferring about 11,176 Mm$^3$ of surplus water from the proposed Mani Bhadra reservoir on Mahanadi River to Dowleswaram barrage on river Godawari.

The link will provide irrigation benefits to an extent of about 3,52,223 ha and 1,02,006 ha utilizing 307 and 547 Mm$^3$ of water in Orissa and Andhra Pradesh respectively.

CSMRS carried out a construction material survey work at field and collected samples for assessing their suitability. Laboratory testing work of the collected materials has been completed and results were sent to the project authorities. The final report is under preparation.

- **Rihand Dam Project, Uttar Pradesh**

Rihand concrete gravity dam situated in the district of Sonebhadra, Uttar Pradesh is a 91.96 m high and was constructed during the period 1954-62 across the river Rihand, a tributary of Sone. The powerhouse is situated at the toe of the dam, with a capacity of 300 MW of power generation.

The concrete dam is experiencing both seepage and leaching phenomena in the drainage galleries of the dam.

Geotechnical instrumentation for rehabilitation of the Dam and water quality analysis for chemical investigation of Industrial Pollutants are being done by CSMRS since July, 1995 and September, 1998 respectively.

The Instruments used for Crack deformation are 3-D Crack Monitors at 10 locations and
Digital Vernier Caliper pins at 22 locations at Dam and in Powerhouse. Regular monitoring is being done and Interim Analysis Report has been sent to the Project authorities.

A team of senior officers of CSMRS visited Rihand Dam Project, UP for in situ investigation of industrial pollutants, discharge from flyash ponds, seepage in Powerhouse and collected various water samples for detailed chemical analysis at the CSMRS laboratory.

● Tehri Rockfill Dam, Uttaranchal

A 260.5 m high Rockfill Dam is at an advanced stage of construction near Tehri town in Uttaranchal. The Dam has already been constructed upto about 165 m height. Out of the total requirement of soil for core construction, two thirds of volume has already been met with. For the remaining requirement from the Koti borrow area, soil is found to contain significant percentage of phyllitic material. In order to assess the suitability of Koti borrow area material, a team of senior officers, inspected and witnessed the in-situ density and field permeability tests, both for clay core and filter materials of the Dam. They also participated in the field laboratory index tests being conducted by the project staff.

The team also visited the site laboratories for assessing the availability of equipments and apparatus for taking up the quantity control

![Thermal Power Plant located on the periphery of reservoir. The dark coloured portion of the photo near the exit pipe indicates mixture of reservoir water and ash slurry.](image-url)
Field parties of CSMRS visited the Tehri Dam Project site at regular intervals in connection with quality assurance with particular reference to compaction of various embankment materials and concrete works at different locations of the project as per the Memorandum of Understanding (MoU) signed between CSMRS and THDC.

The 18th Meeting of the Technical Advisory Committee on Tehri Dam Project, Uttaranchal was also held in CSMRS on 20.11.2001 to review the results of tests conducted by CSMRS on clay samples collected from Koti and Dobra Borrow Areas and quality assurance tests on concrete mixes conducted at site. The meeting was attended by the Director and other officers of CSMRS. The test results were presented before the members of the committee. They also visited the different laboratories of CSMRS.

- **Kol Dam Project, Himachal Pradesh**

The Kol Dam H.E. Project is located across the river Satluj near Bilaspur, Himachal Pradesh. The project envisages construction of a 163 m high Earth and Rockfill Dam with impervious clay core, a 420 m long concrete chute spillway with gated crest and associated structures like diversion tunnel, desilting chamber, powerhouse, etc. It is estimated that about 2.00 million cubic metres of impervious clay core material is required for the construction of the impervious core of the Rockfill Dam. The work of Geotechnical Investigations on the core materials of Panjgain Valley for the proposed Dam Project was taken up following the discussions held between the officers of WAPCOS and CSMRS. A total of 8 Undisturbed soil samples and 8 Disturbed soil samples have been collected for characterizing the Soil for use as core material.

Electrical Resistivity sounding survey was also carried out to locate the thickness of the sub-surface materials at Panjgain and Kian terraces for deciding the borrow areas for the core and filter materials. 41 Vertical Electrical Sounding (VES) points were surveyed. The data was interpreted and report submitted to the project authorities.

- **Teesta H.E. Project, Stage-II, Sikkim**

The Teesta H.E. Project, Stage-II, in Sikkim is proposed to be constructed across river Teesta (Lachung Chu). The project envisages construction of two suitable diversion structures, one on each flank of the river Teesta i.e. Western flank Lachen Chu and Eastern flank Lachung Chu. The diverted water will be reaching through two Head Race Tunnels to a common surge shaft at Chungthang. After exploring various alternatives, it has been tentatively decided to go in for a concrete dam at dam axis IX at Bonsol on Lachen Chu, Full Reservoir Level (FRL) being 2300.00 m and another Rockfill dam at dam axis V (A) at Lema on Lachung Chu, FRL being 2330.00 m.

A CSMRS field party visited the project site for carrying out field and laboratory Geotechnical investigations.
Another team also visited the project site for conducting Goodman Jack tests for in-situ stress measurements. The test could not be conducted due to the presence of fractured zone in the borehole.

Various field parties visited the project on different occasions and carried out construction materials survey and collected coarse and fine aggregate samples for assessing their suitability as construction material. Their report is under finalisation.

Large size Triaxial tests and Large size odometer tests were conducted on Kian terrace rock fill materials of maximum particle size of 20 mm, 40 mm, 80 mm under different confining pressures to evaluate the angle of shearing resistance, deformation characteristic/permeability for modeled material. This was extrapolated for prototype rock fill materials to be used in the construction of rock fill dam.

Field investigation including the analysis of in-situ data of Standard Penetration (STP) and Permeability Tests etc. and Laboratory investigations including the Index properties, relative density, direct shear and laboratory permeability tests etc. were conducted.

- **Purnagiri Re-regulating H.E. Project, India/ Nepal**

The proposed Purnagiri Re-regulating dam project, India / Nepal situated at down stream of Pancheswar Multipurpose H.E. Project envisages the harnessing the water resources of the river Mahakali near Tanakpur (Sarda river in India side), a border town between India and Nepal, by constructing a re-regulatory dam across river Mahakali for irrigation etc. The work consisted of collection and testing of representative bulk soil samples from the borrow pits from the two borrow areas, their Index and engineering behavior, to evaluate their suitability for core construction of the rockfill dam. The report has been submitted to the Project Authorities.

Also the work of field and laboratory Geotechnical investigations for Riverbed material from Purnagiri re-regulating structure of the Pancheswar Multipurpose Purpose Project was taken up at the request of Senior Engineer, Joint Project Office- Pancheswar Investigation (JPO-PI), Kathmandu.

- **Purulia Pumped Storage Project, West Bengal**

West Bengal State Electricity Board (WBSEB) is the executing agency for the proposed hydroelectric project with installed capacity 225 x 4 MW. The project envisages construction of upper dam (71 m height) and lower dam (91 m height). The pre-construction Geotechnical investigation work has also been allotted to CSMRS by the West Bengal State Electricity Board (WBSEB). Field investigation including identifying the potential rock quarry near the project site and collection of representative rock fill material, has been done by CSMRS. Representative bulk, rock fill samples have also been collected from Dulgubera quarry by blasting and an
average prototype gradation curve was obtained. The blasted material was subjected to various laboratory tests at CSMRS. Relative density test was also carried out to ascertain compaction density. For the evaluation of strength characteristic of the materials, large size Triaxial, shear tests have been performed.

● **Lakya Tailings Dam, Kudremukh, Karnataka**

In order to increase the storage capacity of the existing Lakya Tailings Dam, Kudremukh for containment of non-ore tailings, the project authorities have proposed to raise the height of the tailings dam by 15 meters in three stages. The investigations, both field and laboratory, on tailings material and soil were conducted in order to evaluate the Index and engineering characteristics of the materials to be used for construction to raise the height of the existing dam by 5 meters in the 1st stage. The investigation report was finalized and sent to the project authorities.

● **Parbati Dam Project, Himachal Pradesh**

The National Hydro Electric Power Corporation Ltd., (NHPC) has taken up the work of preparation of detailed project Report (DPR) for Parbati H.E. Project (Stage-III), H.P. The project envisages construction of a rockfill dam at Suind, Distt. Kulu on the river Sainj (a tributary of Beas river). The diversion dam will have maximum height of 40.00 m and length of 200.00 m at top. An underground powerhouse will have 4 turbines of 130 MW each.

Laboratory soil investigations were carried on soil from different borrow areas to be used for clay core for proposed earth and rockfill dam. Suitability of the core materials in terms of Index, strength, compressibility and drainage characteristics were determined and a report on these was sent to the project authorities.

A list of Investigations/feasibility reports finalized and sent to the respective project authorities is given below:

- Report on Cyclic Triaxial Tests conducted on core materials pertaining to Kol Dam Project, Himachal Pradesh.


- Foundation Investigation for the proposed Multi-storeyed Building at B5 Block site, Dhirpur (DDA), New Delhi.


- A report on large size Triaxial Shear Test carried out on Harnora Terrace Rockfill material of Kol Dam HE Project, Himachal Pradesh.

- A report on large size Triaxial Shear Test carried out on Kian quarry (Blasted) Rockfill material of Kol Dam HE Project, Himachal Pradesh.
— Geotechnical Investigation on the core materials from Panjgain Valley for the proposed Kol Dam Project, Himachal Pradesh.

— A report on large size Oedometer Test carried out on Harnora Terrace Rockfill material of Kol Dam HE Project, Himachal Pradesh.

— A report on large size Oedometer Test carried out on Kian quarry (Blasted) Rockfill material of Kol Dam HE Project, Himachal Pradesh.

— A report on large size Oedometer Test carried out on Kian Terrace Rockfill material of Kol Dam HE Project, Himachal Pradesh.

— Laboratory soil Test results to ascertain the suitability of soil as fill material for Dhaula Kuan Flyover, New Delhi

— Laboratory Geotechnical Investigations on the foundation soil samples of Madikheda Main Dam Project, Madhya Pradesh.

— Laboratory Geotechnical Investigations on the borrow area materials for the proposed Kashmir Railway Project, Jammu & Kashmir.

— A report on large size Triaxial Shear Test carried out on Lima Terrace Rockfill Materials of Teesta HE Project, Stage II, Sikkim.

— Foundation Investigation for the proposed Multi-storeyed Building at B2 Block site, Dhirpur (Delhi Development Authority), New Delhi.

— A report on large size Triaxial Shear Test for Terrace Materials from Purnagiri Re-regulating Structure of Pancheshwar Multi-purpose Project, India/Nepal.

— A report on large size Oedometer Test for Terrace Materials from Purnagiri Re-regulating Structure of Pancheshwar Multi-purpose Project, India/Nepal.

— A report on 34 Soil Samples collected from the Purnagiri Re-Regulating Dam Project, India/Nepal for their index properties and Engineering behaviour.

— A report on borrow area soil/tailings investigation of Lakya Tailings Dam, Kudremukh, Karnataka.

— A report on soil investigations carried out on breached portion of the flood embankment between Ch 1658 to 1671 of Buxar Koelwar Ganga Embankment, Bihar.

— A report on the Geotechnical Investigations of Soil dispersibility characteristics of borrow area core materials for the proposed Pancheshwar
Multi-purpose Dam Project, India/Nepal.


- Report on laboratory Geotechnical Investigation for Soil Dispersivity Identification Tests on Soil samples of Sukli Irrigation Project, Rajasthan.


- Report on the fifth periodic non-destructive testing of concrete on the Upstream (U/S) & Downstream (D/S) faces of Bhakra Dam, Punjab by ultrasonic pulse velocity method using Portable Ultrasonic Non-destructive Digital Indicating Tester (PUNDIT).

- Report on Suitability of Cement samples received from Sagar Water Supply Scheme, Madhya Pradesh.

- Report on suitability of cement samples received from Sagar Water supply schemes, Sagar.

- Report on Micro silica as per Canadian Standard received from M/s Shakti Traders.


- A report on the chemical analysis of concrete and water samples from Central Public Works Department (CPWD), Central Design Organization (CDO), Nirman Bhawan, New Delhi.

- A report on the chemical analysis of concrete and water samples from H Division, Central Public Works Department (CPWD), New Delhi.

- Test results of Physical Tests conducted on Broken Boulder materials of Dobata borrow area of Tehri HE Project, Uttarakhand.

- A report on Laboratory Investigations for suitability of coarse and fine aggregate samples for Subansiri Lower Dam Project, Arunachal Pradesh/ Assam.

- Report on suitability of coarse aggregate samples from Kol Dam Project, Himachal Pradesh.

- Report on Laboratory Investigations of Tarapur Atomic Power Project, Maharashtra.

- Report on the construction material survey and laboratory investigation of
coarse and fine aggregates for the proposed Daman Ganga Pinjal Link Project, Maharashtra and Gujarat.

- Report on the construction material survey and laboratory investigation of coarse and fine aggregates for the Purnagiri re-regulating dam structure for the proposed Pancheshwar Multipurpose project, India-Nepal.

- Report on physical tests conducted on coarse and fine aggregate samples of Teesta H.E. Project, Stage-II, Sikkim.

- Report on physical tests conducted on coarse and fine aggregate samples Mahanadi-Godavari Link Project, Andhra Pradesh Portion, National Water Development Agency (NWDA).


- Report on the Chemical Analysis of 4 Nos. of limestone rock samples and 2 Nos. of water samples of Kol Dam Project, Himachal Pradesh.

- Report related to chemical analysis of fly ash sample of National Council of Cement and Building Materials (NCCBM) under inter laboratory-testing programme.

- Report on Construction Materials Survey and testing of coarse and fine aggregate samples of Rupaligad re-regulating Structure of Pancheshwar Multipurpose Project, India-Nepal.

- Report on Construction Material Investigation for Manas Sankosh Teesta Ganga Link Canal Project, NWDA.

- Report on Construction Materials survey and laboratory testing of riverbed materials and natural sand samples for use as Coarse Aggregate and Fine Aggregate respectively in concrete for Sarda-Yamuna Link Canal Project, NWDA, Uttar Pradesh.

- Report on the non-destructive testing of concrete in various drainage galleries of Pandoh Dam, H.P by Ultrasonic Pulse Velocity method, using PUNDIT.

- Report on shotcrete mix design for Greater Shillong Water Supply Scheme, Meghalaya.

- Interim report on Deformability of Rockmass by Goodman Jack Test conducted at Subansiri Lower H.E. Project, North Lakhimpur, Assam/Arunachal Pradesh.

- Brief note on Geotechnical Investigations carried out for the proposed spillway of Durgawati Dam Project, Bihar.

— An Interim Report on Deformability of Rockmass by Plate Load testing in Drift DL 3 at Subansiri Lower HE Project, North Lakhimpur, Assam/Arunachal Pradesh.

— A report on In-situ Shear Tests of Rockmass in Drift DL 2 at Subansiri Lower H.E. Project, North Lakhimpur, Assam/ Arunachal Pradesh.

— A report on Rock Mechanics Investigations conducted at Subansiri Lower Project, North Lakhimpur, Assam/ Arunachal Pradesh.

— An Interim analysis report on the continued performance monitoring of Geotechnical Instruments installed in the Power House and Dam body of the Rihand Dam Project, Uttar Pradesh.


— Report on laboratory testing for uniaxial compressive strength and point load strength index for Teesta Low Dam Project (Stage III & IV), West Bengal.

— Report on laboratory investigation of the foundation rock from the Dam site area of Mansi Wakal Dam Project, Rajasthan.

— Technical Comments Offered on Geotechnical investigation report for the proposed Sidatha Medium Irrigation Project, Himachal Pradesh.

— Technical Comments Offered on Geotechnical investigation report for Teesta-Ganga Link Canal Project, Stage-II, West Bengal.

— Technical Comments Offered on Geotechnical investigation report for Deopani Multipurpose Project, Arunachal Pradesh.

**TRAINING IMPARTED BY CSMRS OFFICERS TO DIFFERENT GROUPS OF VARIOUS CATEGORIES ON TOPICS RELATED TO THE WATER RESOURCES DEVELOPMENT PROJECTS**

— Newly recruited Assistant Directors of CWC, New Delhi under the 16th Induction Training Course. A total of 20 officers attended the training from 06-10 October, 2001.


— The officers of CSMRS visited North Eastern Hydraulic and Allied Research Institute (NEHARI) Laboratories, Brahmaputra Board, Guwahati in connection with imparting training, guidance and supervision for Laboratory Soil testing.

— M.Tech Students from IIT, Delhi for use of Universal Distinct Element Code (UDEC) software.

— The activities of CSMRS and the Laboratories were shown to the Students / Practicing Engineers from the following institutions:-
  ● Government Polytechnic, Nilokheri, Karnal, Haryana.
  ● Trainee Officers from NCCBM.

— The training was imparted to the following group of Trainees:-
  ● Various training programmes organized by National Water Academy, Pune.
  ● The Students from Indira Gandhi Nehru Open University (IGNOU), New Delhi.
  ● The Students from Delhi College of Engineering, University of Delhi.
  ● The trainees from Public Health Engineering Deptt., Shillong, Meghalaya.
  ● A group of Civil Engineers from various State Government Departments.
  ● The officers from Railway Design & Standard Organisation (RDSO), Lucknow on the evaluation of Dynamic Properties and Liquefaction parameters required in connection with Design of Embankments in Earthquake zones.
  ● Officers from Tehri Hydro Development Corporation Ltd. (THDC), Tehri, Uttaranchal.
  ● Officers from Irrigation Research Institute (IRI), Roorkee

EXHIBITIONS

CSMRS officers have participated actively in displaying multi-disciplinary activities of CSMRS related to water resources projects.

The display or presentation was done by way of physically demonstrating the special types of equipments/gadgets showing and explaining through photographs and write-up materials etc in the following venues:-

— Krishi Expo-2001 at Pragati Maidan, New Delhi from 24.2.2001 to 1.3.2001

— Curtain raiser function of the Water Resources day and World Water day at Teen Murti Auditorium New Delhi on 22.3.2001

AWARDS RECEIVED


RESEARCH / TECHNICAL PAPERS

A total number of 21 research/technical papers were published in various journals/conferences as indicated below:-


— A technical paper entitled “An overview


ACTIVITIES IN THE NORTH EAST

The following projects in the North Eastern States are being investigated by CSMRS over the past few years :-

● Myntdu Leska H.E. Project, Meghalaya

Myntdu Leska Project envisages the construction of concrete gravity dam with installed capacity of 84 mw (power generation). The project is located at about 140 Km from Shillong in the District of West Jagantia Hills.

CSMRS field party visited the site for carrying out construction material survey and collection of samples for assessing their suitability for use in concrete dam. The work is in progress.
An estimate of Rs. 4.50 Lakhs has been sent to the Project Meghalaya State Electricity Board, Shillong for “Assessing the effect of the Myntdu River Water on Durability of Concrete”.

- **Greater Shillong Water Supply Schemes, Meghalaya**

The Greater Shillong water supply scheme envisages the construction of a concrete gravity dam for catering to the drinking/domestic water supply in the city of Shillong and adjoining areas. CSMRS has conducted the construction material survey followed by mix design in respect of 8 grades of concrete to be used in construction of Mawphlang Dam.

The CSMRS carried out further work at site relating to the mix design of concrete and shortcreting work. The work was completed and the final report was also sent to the project authorities.

- **Pagladia Dam, Nalbari, Assam**

Estimate for field soil investigation at Pagladia dam was sent to Brahmaputra Board, Guwahati.

Liquefaction potential evaluation of Foundation strata of Pagladia dam, Assam has been completed.

- **Tuirial H.E. Project, Mizoram**

There is a proposal by North Eastern Electric Power Corporation (NEEPCO) Ltd. to construct a homogeneous earthfill dam of 77.00 m height on river Tuirial, Aizawl, Mizoram. Two units of 30 MW each shall be installed for power generation.

Laboratory soil investigations for borrow areas were carried to ascertain the suitability for construction.

**INDIAN NATIONAL COMMITTEES**

The following two national level committees were constituted by the Govt of India for funding/providing financial support to various Research/Educational Institutions for carrying out basic/applied research in the field of Rock Mechanics, Soil Mechanics and Construction Materials and Structures:

- **Indian National Committee on Geotechnical Engineering (INCGE)**

The present status of the Research Schemes is given as under:-

1. Total no. of Research Schemes sanctioned 39
2. Sanctioned amount of grant-in-aid Rs.337.43 Lakhs
3. Grant-in-aid released till date Rs.228.89 Lakhs
4. No. of schemes completed 14
5. State of the art reports printed and distributed amongst Principal Investigators (PI’s) Academicians/researchers 3
6. No. of schemes closed 2
7. Schemes likely to be closed 9
8. On-going projects 14
9. New schemes under consideration 6
The present status of the Research Schemes is given as under:-

(i) Total no. of Research Schemes sanctioned 19 Nos.

(ii) Sanctioned amount of grant-in-aid Rs.193.33 Lakhs

(iii) Grant-in-aid released till date Rs.144.22 Lakhs

(iv) No. of schemes completed 6

(v) Schemes likely to be closed 5

(vi) On-going projects 8

(vii) New schemes under consideration 10

PROGRESSIVE USE OF HINDI (RAJBHASHA)

The Central Soil & Materials Research Station (CSMRS) an attached office of the Ministry of Water Resources of India is an apex Organisation of the country dealing with the problems of geotechnical engineering and construction materials as applied to Water Resources Development Projects. Although the Research Station is concerned with the highly technical works of engineering and scientific nature, yet it is committed to overall development of official language.

Annual Report and Newsletters of the Research Station are being printed bilingually. In addition to this a Hindi magazine “RASA” for the year 2000 has also been published. One employee was nominated for Hindi training under the Hindi teaching scheme and one another employee was nominated for Hindi stenography.

Hindi Pakhwara was also organised in the office from 01.09.2001 to 15.09.2001 with a view to create consciousness amongst the staff and thus accelerate the use of Hindi as official language. During this period a Hindi workshop was organised from 10.09.2001 to 13.09.2001 in which 4 officers delivered lectures and almost 26 officers/employees were given training. Hindi competitions i.e. Hindi Bhashan, Hindi Ashu Bhashan, Hindi Prashan Manch and Hindi Kavita Path were also organised during Hindi Pakhwara.

OTHER TECHNICAL ACTIVITIES

National Seminar on “Utilisation of flyash in water resources sector” - 2001

A two day National Seminar on “Utilisation of flyash in the water resources sector” was organised in the CSMRS auditorium on 11th 12th April 2001. The Seminar was inaugurated by Hon’ble Union Minister for Water Resources Shri Arjun Charan Sethi. In addition, Shri B.N. Navalawala, Secretary to the Government of India, Ministry of Water Resources, Shri Palat Mohan Das, Additional
Secretary, Ministry of Water Resources and Dr. B.K. Mittal, Chairman, Central Water Commission (CWC) were the main participants among 250 delegates from all over the country which included top level designers from Central and State Design Organisation, Premier State Irrigation Research Institutes and representatives from leading cement manufacturers, consultants and policy makers, experts Bureau of Indian Standards and others.

The storage and disposal of flyash is a major problem, which besides causing environmental concern also requires large areas of land including agricultural fertile land for storing it. In our country only about 13% of the total flyash generated so far is being used for construction and other purchase in comparison to 31% in United States of America, 38% in China, 58% in Germany and 49% in United Kingdom.

Since flyash can be effectively used in various civil engineering construction by replacing cement the issue was deliberated upon in the seminar and concluded to use this waste material as a useful construction material in one form or the other. The Hon’ble Minister of Water Resources and the Secretary (WR) in their addresses emphasized that Research & Development (R&D) organizations should come forward in publicizing the effective uses of flyash in Water Resources and other civil engineering sector vis-à-vis generating the...
awareness of the public and other users in this regard so that the full potential of flyash could be utilized.

- Technical Interaction on Utilization of Microsilica in Water Resources

A technical interaction on “Utilization of micro silica in water resources sector” was organized on 30th July 2001 in CSMRS. The technical interaction meet was inaugurated by Smt. Bijoya Charkavarty, Hon’ble Union Minister of State for Water Resources. In addition, the interaction meet was also attended by Shri B.N. Navalawala, Secretary, Ministry of Water Resources who gave the presidential address on the effective use of silica fume. On this occasion among participants from all over the country, which include a top level designers from Central and State design Organizations, premier State Irrigation Research Institute. Other experts who also deliberated upon the subject of Utilization of Microsilica in water resources sector included Dr. B.K. Mittal, Chairman, CWC and Dr. K. Venkatachalam, Director, CSMRS. Besides, Mr. Terrance C. Holland, Vice President of American Concrete Institute, USA and Robert C. Lewis, FCS, MICT from U.K. exemplified that Microsilica is highly useful in achieving better pumpability, reduced weir of concrete equipment, increased cohesiveness compressive strength, bond strength, and resistance to alkali silica reaction, sulphate
resistance and reduced rebound. It was also emphasized in the meet that the performance of flyash concrete could also be improved further with the addition of microsilica up to 10% to 12% by weight of cement as replacement.

This interaction not only helped to create public awareness in the utilization of microsilica in the water resources sector but also paved the way for involving the people participation in such activities.

**MISCELLANEOUS ACTIVITIES**

**Redressal of Grievances**

During the year 2001-2002 the status of redressal of grievances is as follows:-

- No. of grievances pending as on 01.04.2001: 7
- No. of grievances received during the year: 5
- No. of grievances disposed off: 5
  (a) In favour of the applicants: 2
  (b) Not in favour of the applicants: 3
- No. of grievances pending as on 31.12.2001: 7

**Vigilance Activities**

During the year 2001-2002, one Departmental proceeding was initiated. Oral inquiry is under progress.

All the Annual Immovable Property Returns pertaining to Group A and Group B officers have been computerized for proper monitoring and further follow up.

Vigilance Awareness Week was celebrated from 31st October, 2001 to 6th November, 2001. The program began with a pledge, administered by the Head of the Department and was taken by all officials. Subsequently, all the messages of eminent persons received in CSMRS were read out to the audience one by one by the Senior Officers of this Research Station. Banners, posters highlighting the dangers of corruption and its evil consequences were prominently displayed at prominent places in CSMRS building.
CHAPTER 13

CENTRAL WATER & POWER RESEARCH STATION

HIGHLIGHTS

● Physical and Mathematical model studies for KANDLA PORT
The Central Water and Power Research Station (CWPRS) is actively engaged in the development of Kandla Port for more than three decades. The hydraulic model studies carried out at CWPRS include alignment of various jetties and cargo berths, assessment of capital and maintenance dredging for approach channel, training works for reduction of siltation in Navigation Channel etc. Two physical models of Kandla estuary and Kandla creek to a scale of (1:1000, H, 1:100 V) and (1:300 H, 1:50 H) respectively are used for the hydraulic model studies in addition to this, 1-D and 2-D mathematical models. These studies have helped Kandla Port Trust to progressively enhance the navigation depths in the approach channel from 3.60 m to 5.20 m at present. The Kandla Port Trust has plans to further enhance the draft to 7.00 m in the year 2002, for catering to the draft of container vessels. Studies are under progress at the CWPRS to assess the maintenance dredging aspects of this proposal, which also include Radio Active Tracer (RAT) studies.

● Mathematical model studies for development of Fresh Water Lake at Port Blair
The Andaman and Nicobar Administration has planned to store 40 Mm3 of the fresh water from the heavy rainfall at Port Blair to effectively meet the current as well as the future demands for the next 50 years by creating a fresh water lake in the Flat Bay. In this regard, the CWPRS has conducted mathematical model studies to assess the impact of construction of a barrage on tidal propagation, change in water quality and eutrophication and probable siltation in the proposed lake. The studies indicate that there will be no significant change in the tidal levels along the creek and the water quality in the lake would be within the permissible limits after the proposed development.

● Hydraulic model studies for the reclamation of the gun carriage basin at Mumbai
The Gun Carriage Basin measuring 215.00 m in length x 75.00 m width approximately is located on the south of Jamshedji Bunder inside the general...
Development Plan of Kandla Port

Physical and Mathematical Models for Kandla Port
Mathematical Model Studies for Development of Fresh Water Lake at Port Blair

Flow Field During Construction Stages of Barrage

Concentration of total Coliforms in Proposed Lake
The Indian navy have requested the Research Station to undertake hydraulic model studies to assess the effect of such reclamation on the surroundings and on siltation in the main channel, and Mumbai Harbour in general, and if possible to quantify this.

The studies were carried out on the model of Mumbai Harbour of the scales of 1/400 H and 1/80 V. In order to assess the effect of such reclamation on surrounding area, photographs were taken under existing condition and with reclamation of Gun Carriage Basin. It is seen that such reclamation is not causing any modification in flow pattern and has no effect on the surroundings. The measurement of velocities at different points under existing conditions and with reclamation of Gun Carriage Basin do not show any noticeable change.

- Wave flume studies for the design of breakwater for the proposed lighter harbour project at Dignabad, Andaman

The Andaman and Lakshadweep Harbour Works (ALHW) have a proposal
to develop a lighter harbour for a separate shelter for beaching of the lighters, sand dinghies and to avoid clustering of the lighters around the existing jetties at Phoenix Bay, Port Blair, Andaman. Hydraulic model studies were carried out at CW PRS for the alignment of the proposed breakwater by mathematical model studies and the design of breakwater sections by wave flume studies for initially selected site at the southern entrance of Phoenix Bay. However, after the site visit and the detailed discussions, it was concluded that the proposed site is not feasible due to the limited sheltered area available for berthing of lighters and difficulties in construction of the breakwater due to the steep seabed slope. Alternatively, ALHW Authorities proposed another site at Dignabad about 600.00 m east of the first site.

The modified design of breakwater for trunk portion as well as round head portion was evolved by the wave flume studies using 4 t tetrapods in double layer on 1:1.5 slope in the seaside armour, and 4 t concrete cubes on leeside face, which was kept vertical due to the area constraint. The

Wave Flume Studies for the design of the Breakwater at Dignabad, Andaman
modified design wave height as later suggested by ALHW authorities, was considered as 1.50 m (Hs).

- Development of flood warning system for Kahalgaon Super Thermal Power Project of NTPC (Bihar)

The National Thermal Power Corporation (NTPC) has commissioned Kahalgaon Super Thermal Power Station (KhSTPP) in 1993, in the Bhagalpur district of Bihar State. The project is situated on the right bank of the river Ganga near the confluence of the river Koa with the Ganga. The area is located in the flood plains of river Ganga and is frequently threatened by the floods from Koa and the near by streams. The floods in the years 1993, 1995 and 1999 inundated a vast area upstream of the Koa and the adjoining thermal power station. The NTPC approached CWPRS to take up a study towards the long-term measures to protect the project site from flooding problems and for developing a Flood Warning System for the project and nearby area to meet extreme hydrological events, so that shut down of the plant can be planned if necessary. It has been observed from the mathematical model runs that there is a lag of 23 hours between peak rainfall and peak water level at Koa Bridge on Merry-Go-Round (MGR) rail line and that of 47 hours between peak rainfall and peak water level at Eastern Railway (ER) Bridge. It is recommended that data recording and transmitting type gauges be installed in Koa catchment to collect and transmit real time data on rainfall and water levels, to a base station in the plant area for timely flood warning.

- Hydraulic Model studies for intake structure of Tala Hydroelectric Project, Bhutan

The Tala hydro-electric project, Bhutan is a run-of-the-river scheme on the river Wangchu. The project envisages construction of a 91.00 m high and 128.50 m long concrete gravity dam and an underground power house near Tala with an installed power capacity of 1020 MW. The water conductor system consists of three intakes, three units of desilting basins, 22.25 km long head race tunnel (HRT) and 2.20 Km long tailrace tunnel. The design discharge through each intake is 57.00 cumec. The sluice spillways and overflow spillway are provided in the central portion of dam. The low level sluice spillway is provided to
2001-2002

View of Teesta Dam Spillway looking upstream

Formation of ski-jump jet downstream of spillway with reservoir at FR El. 579 m
flush out deposited sediments the high level overflow spillway is provided for passing the floating debris.

Hydraulic model studies were carried out on a 1/40 geometrically similar scale model. The observations in respect of circulation of flow in front of intakes for various reservoir water levels and various combinations of operation of sluice spillways were carried out. Observations indicated occasional formation of air-entraining vortices for low reservoir water levels. At higher reservoir levels, only coherent or incoherent surface swirls were observed. Thus except for a very remote combination of operations, air-entraining vortices were not observed. In view of this, it is considered that anti-vortex device is not necessary.

- **Teesta Dam Spillway (Stage V), Sikkim**

The Teesta H.E. Project (Stage V), Sikkim envisages construction of a 96.00 m high and 180.00 m long concrete gravity dam across the river Teesta about 2.00 km downstream of the Dikchu confluence, and an underground power house in the left bank of river Teesta near village Sireesta. A spillway consisting of five sluice bays has been provided within the dam for the release of floods and also for the flushing of sediments deposited in the reservoir upstream. A ski-jump bucket has been provided for energy dissipation. The spillway has been designed to pass a flood of 9500.00 cumec at maximum reservoir level of El. 580.72. The power intake has three openings having invert at El. 554.00 m and will carry a designed discharge of 350.84 cumec. Studies in respect of flow conditions upstream of spillway and intake, discharging capacity, water and pressure profiles over the spillway and performance of ski-jump bucket are in progress on a 1:50 scale comprehensive model.
INTRODUCTION

The Central Water and Power Research Station (CWPRS) is the premier national institute offering comprehensive R&D support to a variety of projects dealing with Irrigation, water and energy resources development and water-borne transport, offering consultancy and advisory services to the Government and other Agencies within the sphere of its activities, disseminating expertise and research findings amongst the hydraulic research fraternity, aiding and promoting research activities at various institutions, and carrying out training of research manpower. Since independence, the expansion of CWPRS has been synchronous with the growth of the nation itself. The recognition of CWPRS as the Regional Laboratory for the ESCAP in 1971 is testimony to the quality of services offered by it. UNDP aid delivered through projects in selected disciplines such as ship hydrodynamics, hydro-machinery, coastal engineering, hydraulic instrumentation, earth sciences, hydraulic structures and information technology, up to the eighties, brought the Research Station on par with leading hydraulic laboratories of the world. The capability of the Research Station has enhanced since then in the areas of thermal modelling, computational hydraulics, remote sensing, hydraulic instrumentation and field investigations. The infrastructure developed with these inputs over the successive Five Year Plans paved the way for further assistance by the UNDP in the areas of ‘Mathematical Modelling of Fluvial and Ocean Hydromechanics’ and ‘Automated Operation of Irrigation Canal Systems, in the nineties.

Besides carrying out physical and mathematical modelling studies for solving various complex hydraulic and hydrologic problems, the Research Station has been collecting field data in respect of waves, wind, tides etc.. Underwater seismic reflection surveys are also being undertaken for determining subsoil stratification and geophysical profiles for deciphering the structure of rocks and sediments beneath the floor of water-covered areas. The Research Station also carries out seismic profile studies for evaluating pre and post dredging operations, selection of pipeline routes and siting of tunnels, bridges and other hydraulic structures. CWPRS has made a beginning in application of Remote Sensing techniques for solutions of river and coastal engineering problems.

During the current year from 1.1.2001 to 31.12.2001, 96 new clients-sponsored R&D projects valued at Rs.8.27 crores were awarded in various disciplines.
AREAS OF ACTIVITIES

Hydrology and Water Resources Analysis

The Hydrology and Water Resources Analysis Laboratory undertakes various water resources management studies, such as those relating to simulation of probable maximum flood discharge, estimation of flood levels, routing of floods and reservoir operations, dam break flood analysis, design of storm water drainage systems with the help of mathematical models, reservoir sedimentation, river channelisation, back water effects, optimisation of water resources utilisation, estimation of seepage, development of decision support systems, automated operation of irrigation canals, etc.

Important R&D projects undertaken during the year 2001-2002 are:

- Mathematical model studies for sedimentation upstream of Rockfill Dam, Upper Indravati Project, Orissa.
- Extreme value analysis of hydrometeorological data, Kudankulam Nuclear Power Project, Tamilnadu.
- Area Drainage and Morphological studies for the proposed Super Thermal Power Project at Barh, Bihar.
- Review of Hydrological studies for Kahalgaon Super Thermal Power Station, NTPC, Noida, Uttar Pradesh.
- Desk studies for the proposed sluice across Saloh Nala near Jhulera Bridge, Una, Himachal Pradesh.
- Development of Flood Warning System for Kahalgaon Super Thermal Power Project of NTPC, Noida, Uttar Pradesh.
- Mathematical Model Studies for prediction of development of International Airport on flow condition in Panvel creek, Navi Mumabi, Maharashtra.
- Identifying stream flow measurements sites and measuring structure in Tirumala areas, Andhra Pradesh.

River Engineering

River Engineering Laboratory is responsible for studies relating to flood protection works, bank protection measures, coffer dams and diversion works, barrages and weirs, hydraulic design of bridges, sediment control and exclusion devices, siting of cooling water intakes along reverine water bodies, vortex prevention at intakes, design of canals and canal structures, flood routing and flood forecasting, studies on transportation of river detritus and transportation of solids in conduits, and Inland Navigation.

Important R&D projects undertaken during the year 2001-2002 are:

- Model studies for flushing of Sediment from Dhauliganga Reservoir, Uttarakhand.
● Hydraulic model studies for desilting basin of Dhauliganga hydroelectric project, Uttaranchal.

● Hydraulic model studies for flushing tunnel beyond desilting basin of Dhauliganga Hydroelectric Project, Uttaranchal.

● Mathematical model studies for Reservoir Sedimentation at Chamera Hydro Electric Project, Stage-II, Himachal Pradesh.

● Hydraulic model studies for desilting basin of Chamera HE Project, Stage-II, Himachal Pradesh.

● Hydraulic model studies for flushing of sediment from Ravi reservoir, Chamera Hydro-Electric Project, stage-II, Himachal Pradesh.

● Field studies for Tungabhadra High Level Canal at 2.48Km., 45.00 Km. and 104.78 Km., Tungabhadra Dam, Karnataka.

● Hydraulic model studies for flushing tunnel beyond desilting basin, Tala Hydro-electric Project, Bhutan.

● Hydraulic model studies for flushing of sediment from Tala Reservoir, Bhutan.

● Hydraulic model studies for desilting basin Tala Hydro Electric Project, Bhutan.

● Desk studies for intake and desilting basin of Talchar Super Thermal Power Project Stage-II, Orissa.

● Hydraulic model studies for flushing tunnel beyond desilting basin of Chamera H.E.Project Stage-II, Himachal Pradesh.

● Inspection of site by CWPRS officers for preparing proposed master plan for flood protection works of river Sutlej, Himachal Pradesh.

● Studies for the proposed embankment along left bank of Pawana river near Chinchwad, Maharashtra.

● Inspection of site for locating the make up water intake on river Ganga at Barh for the proposed NTPC Thermal Power Station, Bihar.

● Morphological studies of river Brahmaputra at Saikhowa Ghat Anant Nalla Reach, Assam.

● Site inspection for the erosion problem along the left bank of river Koel No.2 just upstream of Railway Bridge No.694 near Rourkela, Orissa.

● Studies for Western Kosi main canal syphon across River Kamla, Jainagar, Bihar.

● Protection to bridge across Yamuna River on Gwalior Etawah P.G.Jail line, Madhya Pradesh.
Hydraulic model studies for the proposed railway bridge across river Yamuna downstream of Indraprastha Barrage (ITO Bridge) in the Delhi Metropolis.

Hydraulic model studies for the proposed road bridge across river Yamuna downstream of old rail-cum-road bridge at Geeta Colony, Delhi.

Studies for estimation of scour around bridge piers for the proposed railway bridge across the river Yamuna upstream of old rail-cum-road bridge New Delhi.

Desk studies for protection to the rail bridge across Pedhi river on Narkhed-Amaravati new broad gauge rail line, Maharashtra.

Hydraulic model studies for the proposed railway bridge across the river Yamuna upstream of old rail-cum-road bridge, New Delhi.

Desk studies for assessing feasibility of extension of recovery at Bhuntar airport, Himachal Pradesh.

Reservoir and Appurtenant Structures

The Reservoir and Appurtenant Structures laboratory is responsible for studies relating to efficient hydraulic design of spillways, gates, water conducting systems and other structures appurtenant to dams and reservoirs; crest and spillway profiles, energy dissipators, protection works, high head gates, sluices and outlets, surge tanks, tunnels, penstocks and galleries, intakes for pumps and power plants, construction stage profiles for large dams etc.

Important R&D projects undertaken during the year 2001-2002 are:

- Hydraulic model studies for Chamera dam spillway and power intake, Stage - II Himachal Pradesh, 1: 55 Scale 3-D comprehensive model.

- Hydraulic model studies for flow conditions and protection works downstream of the stilling basin, Chamera Dam Spillway, Stage-II, Himachal Pradesh, 1: 55 scale 3-D comprehensive model.

- Desk studies and Inspection of site for Dam, feasibility of power development at Mandira Dam, Orissa.

- Hydraulic model studies for Tala dam intake Structure, Bhutan.

- Hydraulic model studies for intake structure of Tala Hydro - electric Project, Bhutan.

Coastal and Offshore Engineering

The activities of the Coastal and Offshore Engineering Group encompass Hydraulic design of ports and harbours, Design of maritime and off-shore structures including coastal protection works, Training of estuaries and tidal rivers, Evaluation of the effects
of thermal discharge into the marine environment, Estimation of Water quality and pollution due to waste disposal, Intake/outfall studies for power plants drawing seawater for cooling purposes, Inland water transport, Field data collection, Study of hulls and propellers, Navigation studies, Assessment of forces in mooring lines.

Important R&D projects undertaken during the year 2001-2002 are:

- Wave flume studies to evolve the design of the breakwaters for the proposed fisheries harbour at Ponnani, Kerala
- Analysis of Meteorological data; Updating studies conducted in 1984 using data for the period 1984 onwards for Kudankulam Nuclear Power Project, Tamil Nadu.
- Desk and model studies for siltation in the basins of Waterman ship Training centre of the Southern Naval Command at Kochi, Kerala.
- Wave tranquility studies for dry bulk cargo berths 5A and 6A at Mormugao Port, Goa.
- Inspection of intake and outfall system for Dahanu Thermal Power Station (BSES), Mumbai.
- Hydraulic model studies for the provision of seawall and land fill of Gun carriage basin at Kunjali-II, Mumbai.
- 1-D Mathematical model studies to assess the effect of deepening and widening of Sogal channel of Kandla creek, Gujarat.
- Wave tranquility studies for additional facilities near Alparqueiros Hill at Mormugao port, Goa.
- Storm wave hindcasting studies for Paradip port, Orissa.
- Wave flume studies for the Design of Breakwater for the proposed lighter harbour project at Dignabad, Andaman.
- Field studies for the permanent grounding of INS Vikrant ship near Oyster rock, Mumbai.
- Hydraulic model studies for the permanent grounding of INS Vikrant ship near Oyster Rock, Mumbai.
- Protection measures to minimise erosion at Dahanu Beach, Dahanu.

**Hydraulic Machinery**

The Hydraulic Machinery Laboratory caters to contractual tests on turbines, pumps (including submersible pumps), calibration of flow measuring devices etc. measurement of critical performance parameters of large hydromachines like efficiency, flow rate etc. in the field and evolution of remedial measures to mitigate operational problems of.
large hydromachines, evolution of comprehensive designs of pumping systems inclusive of remedial measures to mitigate water hammer in pumping mains. The laboratory also contributes to evolution of hydraulic designs of pump intakes for thermal and nuclear power stations, large water supply systems, lift irrigation schemes etc.

Important R&D projects undertaken during the year 2001-2002 are:

- Hydraulic model studies for pump intake for make-up water system of Talcher Super Thermal Power Project, Stage - II, Orissa.

**Earth Sciences**

The Earth Sciences Laboratory undertakes various studies involving different disciplines like Hydrogeology, Tracer Hydrology, Vibration Technology, Earthquake Engineering Research and Geophysics as relevant to a number of water resources projects, development of ports, establishment of power plants etc.

Important R&D projects undertaken during the year 2001-2002 are:

- Model studies for estimation of High flood levels after Mutha river channelisation, Pune, Maharashtra
- Electrical resistivity logging at Kaiga Project, Karnataka.
- Hydrodynamic and sediment transport simulation for the outer harbour development at Pipavav Port, Gujarat for M/s Gujarat Pipavav Port Limited (M/s GPLL).
- Cross hole seismic studies at units 3 & 4, Kaiga Atomic Power Project, Karnataka.
- Estimation of site-specific ground motion for Earthquake Resistant Design of flat bay barrage, Port Blair, South Andaman Island.
- Cross hole seismic studies at Reactor Building No.3 Tarapur Atomic Power Project (TAPP), Maharashtra.
- Safety of Salandi Dam, Orissa against Blast vibrations due to nearby mining activity, Orissa.
- Non - destructive wave studies to evaluate the In-situ quality of the masonry of Ujjani Dam, Maharashtra.
- Controlled blast studies for tunneling below Gadag-Solapur railway line for construction of Indi branch canal, Karnataka.
- Microearthquake studies at and around Polavaram Project, Andhra Pradesh.
- Seismic Reflection surveys for Koyna Hydroelectric Project, Stage-IV, Maharashtra.
- Seismic refraction survey at Kol dam Project, Himachal Pradesh.
Geophysical investigation for detection of cavities at Dowlaishwaram arm of Godavari anicut, Andhra Pradesh.

Mathematical Modelling Centre

The Mathematical Modelling Laboratory undertakes various studies related to Coastal Engineering Research and Hydraulic Structure Research. The laboratory has capabilities for conducting studies relating to wave refraction, defraction and reflection for determining harbour layouts, simulation of hydrodynamics of estuaries and coastal areas, simulation of wave and tide induced littoral currents, dispersion of pollutants, hot water discharges from thermal and nuclear power plants, salinity intrusion in estuaries, lakes etc., ship manoeuvring studies and simulation of ship behaviour at berths, water resources analysis and management, routing of unsteady flows through open channels, transient flow and water hammer studies etc.

Important R&D projects undertaken during the year 2001-2002 are:

- Mathematical model studies for wave penetration for development of lighter harbour at Phoenix bay in Port Blair, Andaman.
- Field data collection and analysis of data for construction of a jetty, at Alang, Gujarat.
- Mathematical model studies for estimation of littoral drift/shorelines changes for Kudankulam Nuclear Power Project, Tamil Nadu.
- Mathematical model studies to investigate the behaviour of moored chemical tankers of size 6000 DWT, 10000 DWT, 20000 DWT, 40000 DWT, 60000 DWT for Gujarat chemical port terminal company Ltd., Dahej, Gujarat.
- Mathematical model studies for the moored Ship behaviour at the proposed berth No. 8 at Tuticorin port, Tuticorin, Tamil Nadu.
- Mathematical model studies for manoeuvring of ships in order to optimise width of approach channel for ships of sizes 10000 DWT, 20000 DWT 40000 DWT at Kharo Creek for M/s Sanghi Industries Ltd., Gujarat.
- Site inspection of Coastline for estimation of Littoral Drift for Kudankulam Nuclear Power Project, Tamil Nadu.
- Hydrodynamics and salinity flux study before and after the proposed straight cut at Chilika lake(Orissa).
- Mathematical model studies for wave penetration in Campbell Bay Grid Nicobar Island.
- Mathematical Model Studies for
Intake and outfall system of desalination plant and captive Power Plant for M/s Sanghi Industries at Kharo creek, Gujarat.

- Hydrodynamics of Tehri Reservoir, Rishikesh, Uttaranchal.
- Mathematical model studies for Ship manoeuvring for optimisation of approach channel alignment at Baina Bay, Goa.
- Shoreline stability studies using remote sensing technique for the proposed Nuclear Power Project at Kudankulam, Tamilnadu.
- Mathematical model studies for hydrodynamic behaviour and siltation pattern for the proposed development at harbour facilities at Baina Bay, Goa.

Instrumentation and Control Engineering

The Instrumentation and Control Engineering Laboratory at CWPRS is responsible for providing instruments for measurement of various hydraulic parameters, data acquisition, analysis and control systems. This laboratory is equipped with sophisticated systems for measurement, data acquisition and analysis. The Laboratory undertakes field observations and data collection to provide essential and reliable data for use in physical/ mathematical models.

Important R&D projects undertaken during the year 2001-2002 are:

- Operation and Maintenance Manual for Velocity Meter.

Foundations and Structures

The group undertakes structural studies using Mathematical modelling techniques such as finite elements and experimental techniques such as photoelasticity and strain gauging applied to foundation/structural problems of dams, power houses, water conductor system, bridges, aqueducts, surge tanks, tunnels and rehabilitation of structures of national importance. In addition to this, the group also undertakes field investigation for assessment of rock properties, soil characteristics, suitability of epoxy compounds for under water applications, design of concrete mixes, in situ measurement of strain etc.

Important R&D projects undertaken during the year 2001-2002 are:

- Measurement of Engineering properties of rock samples from Power House Location of Ghatghar pumped storage H.E.Project, Thane, Maharashtra.
- Prototype studies on the penstock bifurcation No.2, Upper Indravati Hydro Electric Project, Orissa.
- Dynamic and static properties of rock core samples from Kaiga Atomic Power Project, Units, 3 and 4, Karnataka.
Progressive isothermals and prediction of temperature distribution in overflow and non overflow sections, Indira Sagar Dam, Madhya Pradesh.

Strain Gauge studies on penstock bifurcation and T-branch for Khopoli water conductor system of the Tata HE Project conducted during hydrostatic test at Indian Hume Pipe Factory (IHP factory), Hadapsar, Pune, Maharashtra.

Determination of forces on Horizontal Anchorages of spillway gate of Ujjani Dam, Maharashtra.

Dynamic analysis and assessment of liquefaction potential for Lakya Dam, Kudremukh Iron Ore Company Ltd., Karnataka.

Measurement of in-situ stresses and deformability of rock mass in ventilation tunnel of pumped storage scheme of Ghatghar H.E.Project, Thane, Maharashtra.

Laboratory studies on rock samples from Head works of Tilari Interstate irrigation project, Maharashtra.

Water and Power Information System

The Water and Power Information System caters to collection, storage, analysis and retrieval of information in the broad areas of Water and Power. Ever since its establishment in 1988, it has been rendering useful information services with vast collection of books, journals etc. as below:

Books and Reports : 48,973
Bound Volumes : 16,157
Journals subscribed : 148

A fully computerised Library Information System has been established (making extensive use of the computer network and library management software - LIBSYS), which includes computerised day-to-day library transactions, internal database management and effective information services and document delivery.

External electronic information sources such as Engineering Index (EiVillage), DIALOGUE database, ASCE database have been regularly scanned through Internet for relevant information. The Internet has been extensively used for web surfing, remote login, file transfer and e-mail.

VIGILANCE AND DISCIPLINARY CASES

Vigilance /disciplinary cases and complaints concerning officers and staff of Central Water and Power Research Station received proper and prompt attention. The break up of the vigilance and disciplinary cases in respect of different categories of officers and staff are given in the tables below:
### Table I - Vigilance Cases

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Categories of officers/staff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Group A</td>
</tr>
<tr>
<td>1.</td>
<td>Number of cases pending in the beginning of the year</td>
<td>01</td>
</tr>
<tr>
<td>2.</td>
<td>Number of cases added during the year</td>
<td>01</td>
</tr>
<tr>
<td>3.</td>
<td>Number of cases disposed off during the year</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Number of cases pending at the end of the year</td>
<td>02</td>
</tr>
</tbody>
</table>

### Table II - Disciplinary Cases

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Categories of officers/staff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Group A</td>
</tr>
<tr>
<td>1.</td>
<td>Number of cases pending in the beginning of the year</td>
<td>NIL</td>
</tr>
<tr>
<td>2.</td>
<td>Number of cases added during the year</td>
<td>NIL</td>
</tr>
<tr>
<td>3.</td>
<td>Number of cases disposed off during the year</td>
<td>N/A</td>
</tr>
<tr>
<td>4.</td>
<td>Number of cases pending at the end of the year</td>
<td>NIL</td>
</tr>
</tbody>
</table>

### BUDGET AND FINANCE

An overview of the budget and finance of CWPRS for 2001-2002, as against the actual expenditure during 2000-2001 and proposed budget for 2002-2003, is shown in the following charts.
During 2000-2001, recoveries made by CWPRS through client-sponsored works amounted to Rs 598.00 lakh; with an additional amount of Rs 97.00 lakh recovered under Major Head (MH) 701 Major & Medium Irrigation (M&MI) Revenue Receipts. The recovery target from client-sponsored jobs for 2001-2002 is Rs 600.00 lakh, with anticipated revenue receipts of Rs 75.00 lakh. The following graph delineates the gross and net budget of the institution under MH 2701 M&MI for the previous, current and forthcoming financial years.

Plan Schemes under implementation at the institution, during the current financial year, are:

- Sediment Disposal Research Centre,
- Augmentation of Water and Power Supply,
- Staff Colony Phase-III,
- Hydrology Project,
- Development and Application of Remote Sensing for Hydraulics and Coastal Engineering,
- Upgradation of Coastal and Offshore Data Collection Capabilities and Modernisation of Earth Science Laboratory.
- Information Technology Development

NEW SCHEMES PROPOSED UNDER THE Xth PLAN

Following nine new schemes, eight schemes with full domestic support and one scheme with external aid, have been proposed :-
## PROGRESSIVE USE OF HINDI

Details in brief about the main activities pertaining to progressive use of Official Language Hindi have been described here under:

- Official Language Implementation Committee meetings are held regularly in every quarter as per Government orders.
- Summaries numbering about 20 based on the technical reports have been prepared in Hindi for inclusion in the Annual Reports of CWPRS.
- The CWPRS celebrated Hindi Day on 14th September 2001. Smt. Vidya Bal, well known social worker and editor of "Milun Sarya Jani" (a Marathi publication from Pune) was invited as chief guest on this occasion. The 8th issue of CWPRS Home magazine JALWANI was released by the chief guest. The Commission for Scientific and Technical Terminology under the Human Resources Development Ministry, New Delhi had organised a Seminar at CWPRS from 4th September to 7th September 2001 for finalising about 500 equivalents of hydraulic terminology. Officers expert in this field rendered their valuable contribution during the Seminar.
- On 20th Nov. 2001, the CWPRS Pune has received the prestigious Rajbhasha Vaijayanti Cup - 2001 for the year 2000-2001, securing second position under the Rajbhasha Vaijayanti Puraskar Yojana instituted by the Ministry of Water Resources, New Delhi.

Apart from the above, all possible efforts are being made to comply with the orders received from the Official Language Department and

### Sl.No Name of the scheme

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Name of the scheme</th>
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<tbody>
<tr>
<td>1.</td>
<td>Evaluation of model prototype conformity of hydraulic structures</td>
</tr>
<tr>
<td>2.</td>
<td>Turbulence Research Centre</td>
</tr>
<tr>
<td>3.</td>
<td>Enhancement of research facilities of coastal engineering laboratory</td>
</tr>
<tr>
<td>4.</td>
<td>Earthquake Engineering Research Centre.</td>
</tr>
<tr>
<td>5.</td>
<td>Up gradation and modernization of research facilities of CWPRS laboratories</td>
</tr>
<tr>
<td>6.</td>
<td>Numerical transport modelling for Water Quality Assessment</td>
</tr>
<tr>
<td>7.</td>
<td>Up-Gradation of Mathematical modelling software and hardware</td>
</tr>
<tr>
<td>8.</td>
<td>Modernisation of infrastructure for physical studies</td>
</tr>
<tr>
<td>9.</td>
<td>Improvement of Canal control through modern techniques and technology (Externally aided)</td>
</tr>
</tbody>
</table>
the Ministry of Water Resources, New Delhi from time to time.

**STAFF GRIEVANCES STATISTICS**

Statistical data relating to the grievances of Staff are tabulated below:

| Number of grievances pending as on 01.01.2001 | 12 |
| Number of grievances received during the year | 03 |
| Number of grievances disposed off (i) In favour of applicants | 06 |
| (ii) Not in favour of applicants | 03 |

Number of grievances pending as on 31.12.2001 - 06

**DETAILS OF PAPERS PUBLISHED & PARTICIPATION OF CWPRS OFFICERS**

A total number of 79 papers were published/sent for publication by CWPRS officers in various journals/conferences/congress/symposium etc., the breakup of which is given below along with participation of CWPRS officers in such events. The details are given in Annexure - I.

<table>
<thead>
<tr>
<th>Level/Description</th>
<th>Contribution National</th>
<th>International</th>
<th>Participation National</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journals</td>
<td>02</td>
<td>03</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Interaction Meet</td>
<td>—</td>
<td>—</td>
<td>03</td>
<td>—</td>
</tr>
<tr>
<td>Conference</td>
<td>45</td>
<td>12</td>
<td>45</td>
<td>08</td>
</tr>
<tr>
<td>Workshop</td>
<td>02</td>
<td>—</td>
<td>17</td>
<td>—</td>
</tr>
<tr>
<td>Seminar</td>
<td>05</td>
<td>—</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>Symposium</td>
<td>07</td>
<td>—</td>
<td>14</td>
<td>01</td>
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<tr>
<td>Course</td>
<td>—</td>
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<td>18</td>
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<td>Congress</td>
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<tr>
<td>Convention</td>
<td>03</td>
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<td>06</td>
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<td>ToT Programme</td>
<td>—</td>
<td>—</td>
<td>03</td>
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<tr>
<td>Total</td>
<td>64</td>
<td>15</td>
<td>116</td>
<td>09</td>
</tr>
<tr>
<td>Grand Total</td>
<td>79</td>
<td></td>
<td>125</td>
<td></td>
</tr>
</tbody>
</table>
DISTINGUISHED VISITORS DURING JANUARY 2001 TO NOVEMBER 2001


- Hon’ble Union Minister for Water Resources Shri Arjun Charan Sethi visited CWPRS on 11.05.2001.

(Detailed list of distinguished visitors is enclosed as Annexure-II)

ACTIVITIES IN THE NORTH EAST

Projects

- Morphological studies of river Brahmaputra from Dhingmukh to Dikhowmukh reach, Assam.

- Teesta Dam Spillway (Stage - V), Sikkim

- Seismological studies for Teesta Hydroelectric Project, stage - VI, Sikkim.

- Seismological studies for Teesta
Hydroelectric Project, stage - II, Sikkim.

● Study on induced seismicity of Tipaimukh dam, Manipur.

**Participation in Technical Committees**

● Monitoring Committee for Flood Control Schemes in Brahmaputra and Barak Valleys under Central Loan Assistance (CLA) / Grant-in-aid Schemes.

● Committee for Assessing the Feasibility and Viability of the proposal for protection of Majuli Island from Flood and Erosion, formulated by the Brahmaputra Board, Guwahati.

**Consultation to NEHARI**

A physical model of the river Brahmaputra has been constructed at NEHRI to study the problem of erosion of the right bank at S. Salmara - Phulbari reach and to decide anti-erosion and flood protection measures for the reach. The model was inspected, the studies conducted were discussed, further studies with the help of model were suggested and rough outlines for the final report were drawn.

● The CWPRS is associated with a large number of model studies related to projects in the North Eastern region. A list of such studies undertaken/proposed to be undertaken is given in Annexure-III.

● Membership of Committees associated with North Eastern Region.

● Director, CWPRS is a Member of the Expert Committee, set up by Union Ministry of Environment and Forests, on 'River Valley and Hydroelectric Projects'.

● Chief Research Officer, CWPRS is a member on the Monitoring Committee of North Eastern Council, Shillong viz. "Monitoring of the Flood Management Schemes of NEC in the Brahmaputra and Barak Valleys".

**OTHER/ MISCELLANEOUS INFORMATION**

**Conferences/ Seminars etc. Organized**

● **Dredging Symposium - 2001** was organized at CWPRS in collaboration with Eastern Dredging Association (EADA) on 22-23 February, 2001. Seventy-two delegates from various maritime states and dredging companies participated in the symposium. 25 papers were presented. At the concluding session of the symposium, the thrust areas were identified which included disposal/use of dredged spoil, effect of earthquake on the morphology, etc. An urgent need for establishing a dredging research center in order to achieve self-reliance in the dredging industry, and to catch up with the emerging new technologies, was also emphasized. Most of the participants felt that the CWPRS would be appropriate place to establish the Dredging Research Centre in view of the expertise and facilities available. The
symposium helped in projecting CWPRS facilities to the potential users.

- **HYDRO-2001** conference was organized at CWPRS on 6-7 December, 2001 in collaboration with the Indian Society for Hydraulics (ISH). The conference received an excellent response. 70 papers were received and more than 100 Engineers/Scientists participated. 33 CWPRS officers participated in the conference. This conference not only enabled the CWPRS to project its capabilities but also helped in interacting with other scientists working in water resources. The main Themes of the Conference were:
  - Water Resources Planning & Management
  - Environmental Hydraulics
  - Fluvial Hydraulics
  - Maritime Structures
  - Hydraulic Structures and Machinery
  - Hydraulic Instrumentation
  - Reservoir Induced Seismicity

**Courses Organized**

- Orientation Course on Hydropower Project for National Thermal Power Corporation Ltd. (NTPC) executives was conducted at the CWPRS from 10th-17th September, 2001. This was the second course organized by the CWPRS on a special request from National Thermal Power Corporation (NTPC) since it is diversifying activities into hydropower development. 23 executives participated in the course. Lecture topics included selection of site, geophysical investigations, hydrology, seismicity, reservoir and appurtenant structures such as spillways, energy dissipators, desilting arrangements; hydraulic machinery and instrumentation. The executives were impressed by the different studies being carried out and capabilities/role of the CWPRS in hydropower development. In concluding session, the participants requested the CWPRS to conduct such courses in future also.

- Course for Naval Hydrographic Officers was organized for 10 officers, which included participants from India, Nigeria, Bangladesh and Sri Lanka. In this course, various topics in coastal engineering were covered through 15 lectures over a period of one week.

**MEETINGS**

- 23rd Meeting of Technical Advisory Committee to the Governing Council was held at the CW&PRS on 9th January, 2001.

- 16th meeting of the Governing Council of the CWPRS, Pune was held on 14th
February, 2001 at New Delhi.

- Dam Safety Panel meeting of the Sardar Sarovar Project was held at the CWPRS during 20-21 March, 2001.

- 7th Transport Committee meeting held at the CWPRS on 20th April, 2001.

- Budget & Programme Committee meeting held at the CWPRS on 20th April, 2001.

- 24th Meeting of Technical Advisory Committee to the Governing Council was held at the CW&PRS on 27th December, 2001.

**CWPRS OFFICERS PARTICIPATED IN THE FOLLOWING TECHNICAL COMMITTEES**

- Scientific Advisory Committee to the Cabinet (SAC-C) meeting was held at New Delhi on 9th February, 2001 under the Chairmanship of Dr. Abdul Kalam, Principal Scientific advisor to the Government of India. Dr.I.D. Gupta, Joint Director participated in the special meeting as an invitee to discuss issues related to the Bhuj earthquake.

- 9th meeting of the R & D Evaluation Committee for the Hydrology Project was held at New Delhi on 13th February, 2001. Dr.A.K.Basu, Joint Director participated in the meeting.

- Ganga Flood Control Commission

High Level Expert Committee Meeting was held at Patna from 19-23 Feb. 2001. Shri V.M.Wakalkar, Senior Research Officer participated in the meeting.

- Technical Advisory Committee meeting of the Fluid Control Research Institute held at Palghat, Kerala on 23rd February 2001. Shri A.R.Chavan, Joint Director participated in the meeting.


- Dam Safety Panel meeting of the Sardar Sarovar Project was held at the CWPRS during 20-21 March, 2001. Shri R.M. Khatsuria, Additional Director and Shri P.B. Deolalikar, Chief Research Officer attended the meeting as special invitees.

- Shri S.B. Kulkarni, Additional Director participated in the following Committee meetings during 21-27 March, 2001.
  - Gate regulation Committee meeting of the Farakka Barrage.
  - Feeder Canal Study Group Meeting.
  - TAC of Farakka Barrage Project.

- Smt. V.M.Bendre, Director, CWPRS,
attended the 17th meeting of the Governing Council (GC) of the CSMRS on 23rd March, 2001 at CSMRS New Delhi.

- Shri U.V.Purandare, Joint Director participated in the 2nd meeting of Sub-Group No.4 on Dredging under working group on "Ports and Dredging Facilities" for the 10th Five year Plan on 7th March, 2001 and 25th April, 2001.

- Smt. V.M.Bendre, Director, CWPRS attended meetings of Expert Committee on River Valley and Hydroelectric projects of the Ministry of Environment & Forests held at New Delhi on 30th May, 2001.


- Shri S.B.Kulkarni, Additional Director, CWPRS attended the 21st meeting of International Organisation for Standardisation, Technical Committee - 113/Sub Committee - 6 (ISOTC-113/SC-6) during 14-18 May, 2001 at New Orleans, USA in the capacity of Sub Committee Chairman of ISOTC 113/SC-6.

- Shri M.S.Shitole, Joint Director attended meeting of the Ganga High Level Expert Committee during 6-7th June 2001 at New Delhi.

- Smt.V.M.Bendre, Director and Shri P.B. Deolalikar, Joint Director attended the Technical Advisory Committee meeting of the Tehri Project as special invitees during 19-21 June, 2001 at Bahadarabad, Tehri, Uttar Pradesh.

- Smt. V.M.Bendre, Director, CWPRS Chaired the 39th Technical Advisory Committee meeting on "Comprehensive Scheme of River Training works for improving draughts in Hugli estuary" held at Kolkata on 22nd June 2001.

- Dr. I.D. Gupta, Joint Director participated in three meetings of the Atomic Energy Regulatory Board (AERB) at Mumbai regarding the Kaiga Atomic Power Project (Geotechnical investigation) Tarapur Atomic Power Project (Reviews basin seismic ground motion) and Rajasthan Atomic Power Project (Control blast studies).

- Smt. V.M. Bendre, Director participated in the Consultation Meeting of Women and Water Network India, Ahmedabad on 8 - 9 October, 2001.

- Smt. V.M. Bendre, Director participated in the first meeting of the newly constituted R&D Committee under Indian National Committee on Hydraulic Research (INCH), at NIH, Roorkee 15th October, 2001.

- Smt. V.M. Bendre, Director attended the 5th meeting of the National Level Steering Committee (Hydrology Project)
2001-2002

at New Delhi on 18th October, 2001.

- Dr. I.D. Gupta, Joint Director participated in the 9th meeting of the Earthquake Engineering Sectional Committee, CED 39 (Civil Engineering Department) on 12th December, and the meeting of Drafting Group - 7 (DG7) for Bridges CED 39 on 13th December, at the BIS New Delhi.

**PUBLICATIONS**

The CWPRS has been publishing annual home magazine viz. JALWANI (in Hindi) in which technical, non-technical and other useful general information compiled/prepared by staff members is published. This year 7th issue was released.

Similarly a technical contribution viz. 'JALSHAKTI' (in English) is also published regularly giving important technical information on R&D activities of the Research Station. The issue of JALSHAKTI are sent to various clients for their information.

A monthly publication viz. 'Monthly technical bulletin' is published for internal circulation giving information on jobs awarded, estimates submitted, technical reports sent to clients, papers/abstracts published/sent for publication, list of visitors, participation of CWPRS officers in conferences, meetings etc. for the benefit of CWPRS staff.

**DETAILS OF OFFICERS DEPUTED ABROAD FOR TRAINING/ WORKSHOP/ SYMPOSIA**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name</th>
<th>Particulars</th>
<th>Period</th>
<th>Institute/ Country</th>
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</thead>
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<tr>
<td>1</td>
<td>Mrs. V.M. Bendre, Director</td>
<td>Delivering Response Speech on &quot;Managing Changes in Research Institute&quot; at the parallel Symposium of 29th International Association for Hydraulic Research (IAHR), Congress.</td>
<td>17-19 September 2001 Beijing, China</td>
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</tr>
</tbody>
</table>

**Annexure - I**

**TECHNICAL PAPERS/DISCUSSIONS SENT FOR PUBLICATION IN JOURNALS**

- "Utility of tracer technique in delineating path of leakage through the body of dam". Third International Conference on Dam Safety Evaluation, 11-14 December, 2001 at Panaji, Goa.


● "Hydraulic model studies for the design of rubble protection over submarine pipelines". Seminar on Emerging Scenario in piping Engineering and Construction on 17th March, 2001 at MIT, Pune.


● "Sedimentation profile for a reservoir across Himalayan river". Seminar on Reservoir Sedimentation, 6-8 June, 2001 at Ooty.

● "Design wave prediction along the coasts of India". International Conference on Coastal Engineering (ICCE-2002), Cardiff, UK; 7-12 July, 2002.


● "Remote sensing and surface Geophysical techniques in the exploration of groundwater at Usha Ispat Ltd., Sindhudurg Dist., Maharashtra, India". Journal of Indian Geophysical Union, Volume 5, Number 1, pp. 41-50 of June 2001.

● "Probabilistic seismic zoning of Maharashtra State". Workshop on Seismicity of Western India the special reference to recent Kutch Earthquake, 14th July, 2001 at Pune.

● "Role of mathematical models in the layout design of ports and harbours". International Conference on Advances in Civil Engineering January 3-5, 2002 at IIT, Kharagpur.

● "Relevance of pumped storage scheme in power scenario". Accelerated Hydro Power Development and pumped storage, 9-10 August 2001 at Chandigarh.

● "Content analysis and retrieval of digital information". Indian association of special libraries and information
centres (IASLIC) XXIII All India Conference, December 4-7, 2001 at Thiruvananthapuram.


- "Optimisation of piping system - A case study". XX annual convention and national seminar on Role of Ground Water Management in Relation to International Water Resources Management, 27-28 December, 2001 at Visakhapatnam.


- "A study of siltation in access channel to a port". Coastal Engineering Vol.43, No.1, May 2001, pp.54-74


- "Effect of Turbulence on Hydrodynamic design and experimental Technique".

Dredging Symposium 2001 : 22-23 February, 2001 at CWPRS, Pune

- Need to Establish a Dredging Research Centre in India.

- Siltation patterns and maintenance dredging requirement for Mormugao Port.

- Underwater Seismic reflection survey for dredging.

- Inland Water Navigation in India.

- Assessment of variability of dredging by trailing suction hopper dredger on clay beds. Role of nuclear logging in dredging operation.

Hydraulic Structures, 6-7 July, 2001 at Bharati Vidyapeeth's College of Engineering, Pune

- Design of coastal rubblemound structures.

- Transmission behaviour of rubblemound breakwater armoured with 50 tonnes concrete cubes.

- Hydraulic and environmental design concepts of prawn culture farm structure

- Field investigation to determine C-value of GRP pipe.
● Performance characteristics of 3-way control valve.

● Multi-functional Role of Coastal Structures in Typical Port and Harbour Layouts.

● Model studies for Tail Race Channel of Hirehalla Dam Project, Karnataka.

● Location of cooling water intake from sediment consideration - A case study.

● Spur-A tool for bank protection - A case study.

● An experience with a dam spillway on a Himalayan river - A case study.

● Limitations of stepped spillway.

● Evaluation of flow conditions and scour for layout of training walls downstream of Ski-Jump Bucket - A Case study.

● Some aspects of hydraulic engineering in inter basin transfer of water.

National Conference on Hydraulics and Water Resources - Hydro 2001, 6-7 December, 2001 at CWPRS, Pune

● An application of synthetic streamflow generation technique.

● Water assessment and optimal operation of an Irrigation system.

● Bank protection with Riprap: Analysis of drawbacks in implementation - field experiences.

● Progressive damages to the hydraulic structures in the hilly region to flashy superfloods - A case study.

● Effect of blocking of littoral drift due to proposed intake channel.

● Estimation of design rainfall depth for storm water drainage system.

● Surface water yield analysis for a small industrial plot.

● Discrimination between RIS and natural
seismicity of Itezhitezhi reservoir, Zambia

- Estimation of design flood discharge GEV Using MOM, MLM, PWM, OSA and PME
- Dynamic analysis of Warna dam - A case study
- Flushing system for desilting basin of a Hydro-Power Project
- Instrumentation for Automatic Hydrographic survey of Tail-race pond d/s of Supa dam, Kali HE Project, Karnataka, India
- Hydraulic design of orifice shape for throttled surge tank - a case study
- Computer simulation as a design tool to minimize sedimentation in harbours
- Near field dilution performance of multiport diffusers
- Studies for assessment of effect on flow conditions and morphology for Sunken Mooring Dolphins at Kandla Port
- Hydraulic aspects for design of top profile of a short length sluice - A case study
- Submergence requirement for various flow Regimes in Plunging Flow Drop Shaft.
- Hydraulic model studies in optimization of the breakwater layout for the fisheries harbour - A case study
- Sandtrap - salient feature of ports on drift prone coasts
- Use of river channelisation in Urban Development
- Lake Tapping - Experience from hydraulic model studies
- Effect of breakwater on shoreline evolution and on approach channel
- Instrumentation, Installation & measuring techniques for dam safety - A case study
- Rapid prototyping and Digital Image Processing Techniques in Photoelastic Stress Analysis
- System for controlling discharge and water level in Hydraulic models
- PC based Bed Profile Measurement system .
- Model investigations for siltation problem in pump sump operating at part load - A case study
- Hydraulic modeling techniques for reinforced rockfill dams - A Review
- Effect of drawal of cooling water on tidal inlet
- Application of electrical resistivity
logging for groundwater exploration at CWPRS campus

- Numerical model studies for the performance of percolation tanks for artificial recharge - A case study

**Participation/ Presentation by CWPRS Officers at Conferences/ Workshops/ Symposia etc.**

**Courses attended**

- S/Shri S.Selvan and Sanjay Pangavhane, Research Assistants completed the three months Certificate Course in "Remote Sensing Application to Marine Environment" from 02.01.2001 to 31.03.2001 at IIRS, Dehradun.

- Shri S.P. Kulkarni, Assistant Research Officer and Sukhadev Singh, Research Assistant, participated in the training course on "Design of Coastal Structures" held during 14-18 May, 2001 at IIT, Chennai

- Shri B.Y.Joshi, Library & Information Assistant participated in Record Management training 44th Certificate course "Care and Conservation of Books, Manuscripts and Archives", from 2nd July to 24th August, 2001 at New Delhi.

- Dr.I.D.Gupta, Joint Director, Dr.S.Balakrishna, Chief Research Officer and Shri N.Ramesh, Research Officer participated in Short term course on "Neural Networks in Civil Engineering" from 12-13 July, 2001 at IIT, Mumbai

- S/Shri Sukhdev Singh and R.S.Chavan, Research Assistants completed four months certificate course in Geoinformatics in Coastal Management, from 6.8.2001 to 16.11.2001 at Dehradun.

- The following officers of CWPRS participated in the Short Term Training Course on "Environmental Impact Assessment Studies for Water Resources Project including Hydroelectric Projects" held during 22nd May to 1st June, 2001 at National Water Academy, Pune:
  - Dr.(Smt.) Shanti Vaidya, Senior Research Officer.
  - N. Shri P.Khaparde, Senior Research Officer.
  - Shri S.G.Manjunath, Research Officer.
  - Miss Suneeta Jatwa, Assistant Research Officer.
  - Shri K.K.Swain, Research Assistant.
  - Shri M.Shanmukha Rao, Research Assistant.

**Participation in Conferences/Seminars**

- Smt. Anuja Rajagopalan, Research
Assistant participated in "Eleventh User Interaction Meet" from 30.01.2001 to 31.01.2001 at Hyderabad.

- S/Shri R.A. Oak, and S.D. Ranade, Senior Research Officers participated in International Conference on "Remote Sensing and GIS/GPS" from 2-5 February, 2001 at Hyderabad

- Mrs. R.V. Karkhanis, Hindi Officer and Shri Ugrasen Singh, Hindi Translator participated in "Promotion of official language : workshop on editing artistic coverage of the best house magazine" 9-10 February, 2001 at Mumbai.

- Shri D.T.Gaikwad, Assistant Documentation Officer, Miss R.S.Gangale, Senior Library & Information Assistant and Mrs. S.S. Oak, Library & Information Assistant, participated in 8th National Convention on "Creation and Management of Digital Resources" CALIBER - 2001, 15-16 March, 2001 at Pune

- Shri V.C.Deshpande, Dr.(Mrs.) R.G.Joshi, Senior Research Officers, Dr.V. Bhavanarayana, S/Shri V.Rambabu and D.K.Awasthi, Assistant Research Officers participated in Seminar on "Earthquake Resistant Buildings" on 17.3.2001 at Institution of Engineers (I), Pune Local Centre, Pune

- Shri M.D. Kudale, Chief Research Officer participated in Seminar on Emerging Scenario in Piping Engineering and Construction on 17.3.2001 at MIT, Pune

- Shri P.Vijayagopal, Assistant Research Officer participated in One day workshop on "Hydrological Data Users Group" on 22.3.2001 at Institution of Engineers (I), Pune Local Centre, Pune

- S/Shri V.T. Desai and A.V. Patil, Assistant Research Officers participated in National Seminar on "Utilization of Flyash in Water Resources Sector" from 11-12 April, 2001 at New Delhi.

- S/Shri S.G.Chaphalkar, Chief Research Officer and U.C.Roman, Research Officer participated in the Seminar on "Cost Reduction for profitability" on 30 May 2001 at Institution of Engineers (I), Pune Local Centre, Pune.

- Following officers participated in Conference on Hydraulic Structures from 6-7 July, 2001 organised by Bharti Vidyapeeth in association with Indian Society for Hydraulics at Pune:
  - V.B. Joshi, Chief Research Officer
  - M.D.Kudale, Chief Research Officer
  - P.B.Mehendale, Senior Research Officer
  - Mrs. V.V.Bhosekar, Senior Research Officer
M.R.Bhajantri, Senior Research Officer
A.V.Mahalingaiah, Research Officer
Mrs.M.I.Sridevi, Assistant Research Officer
M.R.Kulkarni, Assistant Research Officer
A.K.Das, Research Assistant
A.K.Mishra, Research Assistant
Shri M.D.Kudale, Chief Research Officer participated in one week workshop on Geoinformatics, from 6-10 August, 2001 at Pune.

Following officers participated in workshop on "Application of Artificial Neural Network in Civil Engg. and Water Resources" at Central Training Unit, CWPRS from 9-12 October, 2001:

Shri V.G. Bhave, Chief Research Officer
Mrs. Sadhana Kulkarni, Senior Research Officer
Shri M. Selvabalan, Research Officer
Shri U.C. Roman, Research Officer
Shri C. Ramesh, Assistant Research Officer
Shri P. Vijayagopal, Assistant Research Officer
Shri V. Ramababu, Assistant Research Officer
Shri N. Vivekanandan, Research Assistant

Following officers participated in "Dredging Symposium 2001" 22-23 February, 2001 at CWPRS:

Dr.L.K. Ghosh, Joint Director
Dr.N.Ghosh, Joint Director
Shri U.V.Purandare, Joint Director
Shri A.G. Kale, Joint Director
Shri V.V. Vaze, Chief Research Officer
Shri R.K. Kamble, Chief Research Officer
Mrs.V.K. Appukuttan, Chief Research Officer
Shri R.A. Oak, Senior Research Officer
Shri D.N. Deshmukh, Senior Research Officer
Following officers participated in "HYDRO - 2001" Conference 6-7 December, 2001 at CWPRS:

- Shri C.N. Kanetkar, Joint Director
- Shri V.G. Bhave, Chief Research Officer
- Shri D.N. Deshmukh, Chief Research Officer
- Shri R.A. Oak, Chief Research Officer
- Shri P.S. Kapileshwar, Chief Research Officer
- Dr. S. Balakrishna, Chief Research Officer
- Shri V.B. Joshi, Chief Research Officer
- Shri S.G. Chaphalkar, Chief Research Officer
- Shri B.S. Kulkarni, Chief Research Officer
- Shri S. Dhayalan, Chief Research Officer
- Mrs. S.G. Hardikar, Senior Research Officer
- Mrs. Neena Issac, Senior Research Officer
- Mrs. M.M. Bhosekar, Senior Research Officer
- Dr. (Mrs.) R.G. Joshi, Senior Research Officer
- Shri Prabhat Chandra, Senior Research Officer
- Shri C.M. Shah, Senior Research Officer
- Shri A.K. Agrawal, Senior Research Officer
- Shri R.G. Patil, Senior Research Officer
- Shri M.R. Bhajantri, Senior Research Officer
- Shri M.P. Bhide, Senior Research Officer
- Shri Y.N. Srivastava, Senior Research Officer
- Dr. M.M. Kshirsagar, Research Officer
- Shri H.B. Jagdeesh, Research Officer
Shri S.G. Manjunath, Research Officer

Shri P.D. Kamalashekhara, Research Officer

Shri P. Vijayagopal, Assistant Research Officer

Shri V.B. Sharma, Assistant Research Officer

Dr. (Miss) L.R. Pattanur, Assistant Research Officer

Shri N. Vivekanandan, Research Assistant

Shri Arun Kumar, Research Assistant

Following officers participated in International Conference on "Ocean Engineering" at IIT, Chennai, from 10th to 16th 6 December, 2001:

Shri M.D. Kudale, Chief Research Officer

Shri P.S. Kapileshwar, Chief Research Officer

Smt. A.S. Barve, Senior Research Officer

Shri B.M. Patil, Senior Research Officer

Shri Prabhat Chandra, Senior Research Officer

Following officers participated in XXth Annual Convention and National seminar on "Role of Ground Water Management in relation to integrated Water Resources Management" 27-28 December, 2001 at Visakhapatnam (AP):

Dr. (Smt.) C.K. Rani, Senior Research Officer

Shri B.S. Sundar Lal, Assistant Research Officer

Shri D.T. Gaikwad, Assistant Documentation Officer participated in 47th All India Library Conference 20 - 23 December, 2001 at Warangal.

Publications in Journals (From January, 2001 to December, 2001)

The paper entitled "A study of siltation in access channel to a port" by Dr. L.K. Ghosh, Joint Director, Shri N. Prasad, Senior Research Officer, Shri V. B. Joshi and Smt. S. S. Kunte, Chief Research Officers was published in "Coastal Engineering; Vol. 43, No. 1, May 2001, pp 54-74.

The paper entitled "Remote sensing and surface Geophysical techniques in the exploration of groundwater at Usha Ispat Ltd., Sindhudurg Dist., Maharashtra, India" by S/Shri R.S.Ramteke, Chief Research Officer, K.Venugopal and C. Krishnaiah, Senior Research Officers, Dr.N.Ghosh, Joint Director, S.D.Vaidya, Research Officer and G.A.Panvalkar, Research Assistant has published in the Journal of Indian Geophysical Union, Volume 5, Number 1, pp. 41-50 of June 2001.

"Integrating the equation of gradually varied flow" by Shri R.G. Patil, Senior Research Officer, et al., is published in the July 2001 issue of Journal of "Journal of Hydraulic Engineering, American Society of Civil Engineering".

Annexure II

Distinguished Visitors During January, 2001 to December, 2001

- Dr. K.S.Ramshastri, Director, National Institute of Hydrology, Roorkee visited CWPRS on 10.01.2001.

- S/Shri A.S.Pendharkar, Head and Umesh Kulkarni, Scientist from Isotope Division, Bhabha Atomic Research Centre (BARC) visited CWPRS on 18.01.2001.

- Shri S.K. Duggal, Member(Irrign.), Bhakra Beas Management Board accompanied by S/Shri G.D. Gupta, Chief Engineer, and J.K. Bhalla, Director (Designs) visited CWPRS on 10.02.2001.

- Following dignitaries visited CWPRS during Dredging Symposium 2001 from 22-23rd February, 2001:
  - Dr. Jose Paul, Chairman, Mormugao Port Trust
  - Shri N.M.Rao, Chief Executive Officer, Maharashtra Maritime Board
  - Shri S.Gopalan, Development Advisor(Retd.), Ministry of Surface Transport
  - Shri M.M. Kamath, Chief Engineer(Retd.), NMPT
  - Commodore A.Y. Chitnis, Indian Navy, Naval Dockyard
  - Commander S.K.Jha, Hydrographer, Maharashtra Maritime Board
  - Shri K.A. Naqib, Director, Waterways Authority, Jammu & Kashmir
  - Commodore A. Cherian, Chairman, EADA (Retd.)
Following dignitaries visited CWPRS on 20-21, March, 2001:

- Dr. Y.K. Murthy, Chairman, Panel of Experts
- S/Shri G.N. Tandon, A.N. Singh, R.V. Chalapati Rao, V.R. Deuskar from Sardar Sarovar Dam Safety Panel Members, Panel of Experts,
- Shri N.B. Desai, Director from Sardar Sarovar Narmada Nigam Ltd
- Shri S.J. Desai, Chief Engineer from Sardar Sarovar Narmada Nigam Ltd
- Shri N.K. Bhandari, Deputy Secretary, Sardar Sarovar Construction Advisory Committee, Vadodara,
- Shri A.K. Chakravarti, Chief Engineer, R.K. Gupta, Director, C.W.C., New Delhi,
- Shri M.K. Chauhan, Secretary, Narmada Control Authority, Indore

Following dignitaries visited CWPRS on 19-21, March 2001:

- Shri Prashant Goel (IAS), Secretary fisheries, Pondicherry (UT) accompanied by ASPS
- Shri Ravi Prakash, Director, Department of Fisheries and fisherman Welfare, Govt. of Pondichery
- Shri OM Prakash, Director, CICF (Central Institute of Coastal Engineering for Fisheries), Bangalore

- Shri C.S. Sastry, Convenor, Chairman Managing Director, Dredging Corporation of India Ltd., Visakhapatnam visited CWPRS from 25 to 26th April, 2001.
- Capt. C.V. Jose, Dy. Conservator, Cochin Port Trust, Kochi visited CWPRS from 25th to 26th April, 2001.
- Shri P. Rama Rao, Dy. General Manager (Mktg.), Dredging Corporation of India Ltd. Visakhapatnam visited CWPRS from 25th to 26th April, 2001.
2001-2002

- Shri Gopalkrishna, Chief Engineer, CWC visited CWPRS on 9-10 May, 2001.
- Shri Madhuresh Kumar, Chief Engineer (P), Delhi Metro Rail Corporation (DMRC), New Delhi visited CWPRS on 16 May, 2001.
- Dr. S.N. Mandal, Deputy General Manager (PE, C) NTPC, New Delhi visited CWPRS during 23-26 May, 2001.
- Mr. John Tilley, Senior Hydro Environmental Engineer, M/s Mineral technologies Australia, visited CWPRS on 7-8 June, 2001.
- S/Shri Mata Prasad, Member, UPSC and A.C. Tyagi, Commissioner (PP), Ministry of Water Resources visited CWPRS on 2nd July, 2001.
- Dr. R.N. Singh, Director and Dr. Apurba Gupta, Scientist National Environmental Engineering Research Institute, Nagpur visited CWPRS on 4th July 2001.
- Shri P.L. Diwan, Chairman & Managing Director, Water & Power Consultancy Services (India) Limited (WAPCOS), and Dr. Antony Balan, Chief Engineer (S), Central Water Commission, Coimbatore visited CWPRS on 4th July, 2001.
- Shri R.K. Diwan, Chief Engineer (Ganga), Meerut visited CWPRS from 1st to 6th July, 2001.
- Shri Dik Van Uidert, Managing Director, M/s Boskalis, Dredging India Pvt. Ltd. and Mr. Pister Van Groen from Hydronamic, Netherlands, visited CWPRS on 12th July, 2001.
- Lt. Col. J.V. Iyer, Regional Works Officer Head Quarters Coast Guard Region (East), Chennai visited CWPRS on 16th July, 2001.
● Shri B.R. Kadam, Chief Engineer, Bombay Port, alongwith 16 officers visited CWPRS on 28-29th July, 2001


● S/Shri G. Vishwanathan, Chief Operation Officer, NOIDA and Ajay Mathur, Vice President, IL&FS visited CWPRS on 7th August, 2001.

● Mr. T.K. Dewan, IAS, Deputy Chairman, Kolkata Port Trust visited CWPRS on 5-6 September, 2001


● Shri L.N. Gupta, Executive Director, M/s WAPCOS (India) Ltd., visited CWPRS on 11th October, 2001.

● Shri M.K. Sinha, Member Technical, National Highways Authority of India Ltd., visited CWPRS on 22nd October, 2001.


● Shri Naresh Kumar, Chief Engineer (Hydro), Water and Power Consultancy Services (I) Ltd. visited CWPRS on 27-28 November, 2001.


● Following dignitaries visited CWPRS during HYDRO-2001 held on 6-7 December, 2001:
  - Shri N.B. Desai, Director, Sardar Sarovar Narmada Nigam Ltd.
  - Shri P.L. Diwan, Chairman & Managing Director, Water & Power Consultancy Services (India) Ltd.
  - Dr. M.G. Padhye, Former Secretary, MOWR, New Delhi.
  - Shri Vijay Paranjape, Director, Gomukh, Pune.
  - Prof. M.J. Deodhar, Vice President, Indian Society for Hydraulics, Pune.
2001-2002

- Prof. D.M. Kondap, Professor and Head of Civil Engineering Dept., Maharashtra Institute of Technology, Pune.
- Dr. P.P. Vaidyaraman, Former Director, CWPRS, Pune
- Dr. Z.S. Tarapore, Development Advisor, WAPCOS and President, Indian Society for Hydraulics.
- Shri A.N. Dave, General Manager, NTPC, New Delhi.
- Dr. T. Gangadharaih, Former Professor & Head of Civil Engineering Deptt., Indian Institute of Technology, Kanpur.

● Following Environmental Advisory Committee members who attended Interaction Meeting visited CWPRS on 8.12.2001:

- Dr. M.A. Chitale, Chairman, Environmental Expert Committee for Hydroelectric Projects, GWP-SASTAC Regional Office, Aurangabad.
- Dr. S. Bhowmik, Additional Director, Ministry of Environment & Forests, New Delhi.
- Dr. R.K. Khanna, Director, CWC, New Delhi.
- Dr. Apurba Sarkar, Principal Scientist, Modipuram, Meerut.
- Shri O.P. Sisodia, Assistant Commissioner, Ministry of Rural Development, New Delhi.
- Dr. P.G. Sastry, Director R&D, Hyderabad.
- Shri Ramesh Madav, Managing Director, Environmental Restoration Consultant Pvt. Ltd., Mumbai.
- Shri D.M. More, Chief Engineer & Joint Secretary, Irrigation Department, Mumbai.
- Shri Suresh Shirke, Former Secretary to Govt. Director General, Aurangabad.
- Padmashri Dr. Z.S. Tarapore, President ISH, Pune.
- Dr. S. Sarin, Director, National Environmental Engineering Research Institute, Nagpur.
- Shri R.S. Chandramoha, Chief Engineer (CIELA), Kerala State Electricity Board, Trivandrum.
- S/Shri R.N. Mishra, Chief Engineer (Planning) and Vipin Kumar, Manager (Environmental), NHPC, Faridabad.

- Shri Khandekar, Secretary, Interstate

- The following officers from National Thermal Power Corporation visited CWPRS on 22.12.2001:
  - Shri Parvinder Singh, General Manager
  - Shri S.K. Dodeja, Executive Director


- The Following dignitaries visited CWPRS during Technical Advisory Committee meeting held on 27.12.2001.
  - Mrs. Radha Singh, Chairman, CWC, New Delhi.
  - Shri A.N. Dave, Chief Engineer, NTPC, NOIDA.
  - Dr. R.K. Gupta, Scientist G, Ministry of Science and Technology, New Delhi.
  - Shri B.R. Kadam, In-Charge, Chief Engineer, Mumbai Port Trust, Mumbai.
  - Shri D.P. Bobade, DDG & SIO, National Informatics Centre, Pune.
  - Dr. P.P. Vaidyaraman, Former Director, CWPRS, Pune.
  - Shri U.K. Sarvaiya, Director I/c, Gujarat Engineering Research Institute, Vadodara.
  - Shri K.R. Subramanian, Chief Engineer, NWA, Pune.
  - Shri S.L. Abhyankar, Hon. Technical Advisor, Indian Pump Manufacturers Association, Mumbai.
  - Shri P.I. Suvrathan, Joint Secretary, Ministry of Power, Govt. of India visited CWPRS on 28.12.2001.
CHAPTER 14

FARAKKA BARRAGE PROJECT

HIGHLIGHTS

● Special repair & Maintenance including painting works of Farakka Barrage gates are continuing by M/s NPCC Ltd. and M/s Jessop & Co., has been expedited.

● Works relating to road bridge at RD 29.50 of Feeder Canal and several canal bank protection works completed including link road of causeway at RD 7.00.

● Repair & rectification works of Jangipur Barrage has been taken up expeditiously.

● Protection works against bank erosion on the right bank of the river Ganga at Bindugram-Nayansukh covering a length of 4.25 KM has been completed. Along the left afflux bund of Jangipur barrage covering a length of 3.70 KM have been completed. The protection work on left bank u/s of Farakka Barrage has also been completed.

● All the flood protection works were maintained well and no flood and severe erosion problem was faced during the flood season.
The Farakka Barrage at Farakka in West Bengal, aiming at preservation of Calcutta Port by improving the regime and navigability of the Bhagirathi-Hooghly river system, was commissioned in 1975. The increased upland supplies from the Ganga at Farakka into the Bhagirathi have reduced salinity in the system and ensured sweet water supply to Calcutta and surrounding areas from Farakka to Calcutta. The rail-cum-road bridge built across the river Ganga at Farakka has established direct road and rail communication link to the North-Eastern States and bordering countries to North-East. The Bhagirathi, the Feeder Canal and the Navigation Lock at Farakka form a part of the Haldia-Allahabad Inland Waterway (National Waterway No.1). The principal components of the Project are:

- A 2245.00 metre long barrage across the River Ganga with a rail-cum-road bridge and a Head Regulator on the right side.
- A 213.00 metre long barrage across the river Bhagirathi at Jangipur and a lock beside it.
- Feeder Canal of 1,133.00 cumec (40,000.00 cusec) carrying capacity and 38.38 km long, taking off from the Head Regulator.
- Navigation works such as Locks, Lock Channels, Shelter Basins, Control Tower Building, Navigational Lights and other Infrastructure.
- Two Road-cum-rail Bridges & two road bridges across the Feeder Canal.
- A Number of Regulators at different locations in both Murshidabad and Malda District.
- Bagmari Syphon at RD 48.0 of Feeder Canal.

**IMPORTANT ACTIVITIES**

All the principal works concerned with the two Barrages and Feeder Canal have been completed. The navigation lock at Farakka was substantially completed and Commissioned in November, 1987 and Navigation Control Tower in 1996. This has opened a new era of inland navigation on the Haldia-Allahabad inland waterway. The navigation lock at Jangipur has been completed substantially except for some navigation aids and equipment. The anti erosion works in upstream and downstream of Farakka Barrage and maintenance of Guide bund, Afflux bund and numerous vital structures, including operation and maintenance of two barrages and Feeder Canal as well as maintenance of two big townships, is continuing.
For this there are many Committees under whose guidance the works of the FBP are being carried. These Committees are:

1) Technical Advisory Committee, under the Chairmanship of Member(D&R), CWC.

2) Monitoring Committee, under the Chairmanship of Member(D&R), CWC.

SPECIAL REPAIR OF THE HEAD REGULATOR AND MAIN BARRAGE GATES AND JANGIPUR BARRAGE

Repair/rectification works of spillway gates, under sluice/river sluice gates, fish lock gates, gantry cranes with gantry rail over hoist bridge, control panels, hoist system etc. of the Farakka Barrage are being done by M/s NPCC Limited and M/s Jessop & Co., (both Government of India undertakings) on 50 : 50 basis. Repair/rectification of eleven gates of the head Regulator, including hoists, gantry crane etc. were substantially completed. About 22.5% works have been completed so far. Painting of the hoist-bridge, trestle, counter weight boxes, gantry crane etc. have been taken up and the works are being monitored closely to ensure completion within a reasonable time. The special repair and maintenance of Jangipur Barrage is also continuing.

PROTECTION WORKS

Execution of protection work between (Chainage) Ch. 5600m to Ch. 5700m Right Bank downstream of Farakka Barrage has been completed and so far a length of 4.25 km has been completed. The protection works on the Right Bank of the River Ganga downstream of the Farakka Barrage is in progress. Work order for 100m from Ch. 5700m to Ch. 5800m has already been taken up. In addition to these, further work for 500m has been initiated.

The protection works against bank erosion on the Right Bank of the River Ganga along the Left Afflux Bundh of Jangipur Barrage covering a length of 3.70 KM out of a total length of 16.3 KM have been completed.

Strengthening of the Left Afflux Bundh of Jangipur Barrage in some vulnerable reaches has been completed. Bank protection work in between Ch. 415 to Ch. 535 has been planned during 2001-2002.

Marginal embankment for 11.00 KM length on the Left Bank upstream of Farakka Barrage from the Guide Bund out of 40.00 KM is under the jurisdiction of the Farakka Barrage. Due to proper protection measures the breach in the marginal embankment has been prevented even in the highest discharge of 1998.

Work has been taken up by Farakka Barrage for protective measures in the vulnerable reaches as per guideline & recommendation of TAC.

MAINTENANCE OF FEEDER CANAL

3838 km of the Feeder Canal along with several structures, slope protection,
communication roads and several ferry systems are being maintained adequately to ensure supply of water to the canal up to the designed capacity of 40,000 cusecs.

**VIGILANCE**

During the current year, one complaint was received and 10 pending complaints from last year have already been dropped after inquiry.

**REDRESSAL OF STAFF GRIEVANCES**

No. of Grievances pending — 2
as on 01.04.20012
No. of Grievances received — 8
during the year
No. of Grievances disposed off
i) In favour of applicant — Nil
ii) Not in favour of applicant — Nil
No. of Grievances pending — 10
as on 31.12.2001

**TECHNICAL ACTIVITIES**

**NATIONAL SEMINAR ON PARTICIPATORY FLOOD MANAGEMENT AND MITIGATION**

In pursuance of the United Nations Economic & Social Commission for Asia and Pacific (UNESCAP), MOWR, Government of India, a National Seminar was held on 12.11.2001 followed by an official meeting on 13.11.2001 at Kolkata (India). The Seminar was inaugurated by Shri Amalendra Lal Roy, Hon’ble Minister in charge for Irrigation & Waterways Department, Government of West Bengal and was presided by Shri Hafiz Alam Sairani, Hon’ble Minister-in-Charge, Department of Relief, Government of West Bengal & was also attended by the Experts from all parts of the Ganga-Brahmaputra and Meghna Basins. The experts represented the fields of Sociology, Economics, Water Resources and Environment, both in service and retired personnel, along with various NGO’s, Public representatives, village level workers, Panchayats and local bodies. Several technical papers were presented.

The outcome of the seminar and theme paper on the above subject presented by Sri M. U. Ghani, General Manager, Farakka Barrage Project was discussed at Regional Seminar at Bangkok which was attended by several countries.

**VISIT OF HON’BLE UNION MINISTER OF WATER RESOURCES, GOVERNMENT OF INDIA AND HON’BLE MINISTER OF IRRIGATION & WATERWAYS DEPARTMENT OF WEST BENGAL AT FARAKKA BARRAGE ON 09.11.2001**

The Farakka Barrage Project was visited by Hon’ble Union Minister of Water Resources on 9.11.2001 followed by a meeting with public representatives of Murshidabad & Malda Districts and Hon’ble Ministers of West Bengal, and meeting with Chief Minister, West Bengal on 10.11.2001 at Kolkata. In the meeting activities of the Farakka Barrage were reviewed. Several important decisions were taken regarding developmental activities in the Farakka Barrage Project for the benefit of the people of West Bengal.
CHAPTER 15

GANGA FLOOD CONTROL COMMISSION

HIGHLIGHTS

● The second meeting of Indo-Nepal Sub-committee on embankment construction was held at Kathmandu (Nepal) in April, 2001 in which various decisions regarding construction of embankment on Lalbakeya, Bagmati, Kamla and Khandu were taken.

● The report of the High Level Expert Committee by Ministry of Water Resources, Government of India to Study erosion problems in critical reaches of Ganga between Buxar and Mokama was completed and submitted to Ministry of Water Resources for needful action in the matter.

● The Kosi High Level Committee (KHLC) and the Gandak High Level Committee (GHLC) under the Chairmanship of Chairman, Ganga Flood Control Commission (GFCC) inspected the embankments on river Kosi and the right embankment of river Gandak, respectively and suggested flood protection works to be attended to before the flood season of 2002.

● 22 flood management schemes were examined in detail in GFCC, out of which after detailed examination, 7 were accepted and rest 15 comments were sent to the concerned State Government for compliance. Another 20 schemes are expected to be examined by the end of the year.

● The comprehensive plan for the Ghaghra river system was updated and circulated to all concerned for implementation. Updating of a similar plan for the Yamuna and Ajoy river systems is under progress and it is expected that the updating of these two plans would be completed by the end of the year.

● Annual flood report for the year 2000 in respect of Ganga basin was prepared and circulated to all concerned.

● GFCC participated in the meeting for finalising the inception report for Sapta Kosi High Dam Multipurpose Project – Sun Kosi Diversion Scheme held at Kathmandu (Nepal) in October, 2001.
GANGA FLOOD CONTROL COMMISSION

FUNCTIONS AND ORGANISATIONAL SET UP

The Ganga Flood Control Commission (GFCC), established in April 1972 with its head quarter at Patna, serves as the Secretariat and the executive limb of the Ganga Flood Control Board (GFCB) which is headed by the Union Minister of Water Resources. The Hon’ble Union Ministers of Finance, Railways, Surface Transport and Agriculture and the Member Planning Commission are among members of the Board. The Ganga basin states are represented by the respective Hon’ble Chief Ministers or their representatives. The Commission is headed by a Chairman with two full time Members and other supporting officers and staff. The representatives of concerned central ministries and departments as well as the Engineer-in-Chief/Chief Engineers of the basin states are part time members / permanent invitees.

The Commission has been assigned the task of preparing comprehensive plans for flood management of the river systems in the Ganga basin, phasing/sequencing of the programme of implementation, monitoring, performance evaluation etc. of various flood management schemes, assessment of adequacy of waterways under road and rail bridges and providing technical guidance to the basin states on flood management. The Commission also accords technical clearance of flood management schemes of the Ganga basin.

TECHNICAL ACTIVITIES

Updating of Comprehensive plan for flood management

Comprehensive plans for flood management for all the 23 river systems of the Ganga basin have already been prepared up to 1991. The updating of the comprehensive plans is now being taken up and is a continuing activity of GFCC. Upto March, 2001, comprehensive plans for 14 river systems namely Gomati, Mahananda, Ghaghra, Adhwara group of rivers, Kamla Balan, Bagmati, Burhi Gandak, Kiul Harohar, Damodar, Punpun, Mayurakshi-Babla, Ramganga, Jalangi and Tons river systems have been up-dated.

This year the comprehensive plan for Ghaghra river systems was up-dated and circulated to all the concerned for follow up action on the recommendations made in the plan. Updating of comprehensive plans for Yamuna and Ajoy river systems is expected to be updated by the end of March, 2002.

Assessment of adequacy of waterways under road and rail bridges

The study report on adequacy of waterways under road and rail bridges in respect of 20 river system i.e, Punpun, Ajoy, Burhi Gandak,
Mayurakshi, Bagmati, Mahananda, Damodar, Yamuna, Jalangi, Gandak, Gomati, Ghaghra, Ramganga, Rupnarain-Haldi-Rasulpur, Tons, Kamla-Balan, Adhwara group of river, Kiu-Harohar, Badua-Chandan and Sone river systems were completed by the end of March, 2000. Preparation of report for the Kosi river system and updating the report of Damodar river system is under progress.

It is expected that report on Kosi river system would be completed by March 2002.

Monitoring of important flood management schemes

GFCC is monitoring 8 important flood management schemes namely (i) Buxar Koelwar embankment scheme in Bihar (ii) Badlaghat Nagarpura embankment scheme in Bihar (iii) Punpun right bank embankment scheme Phase I in Bihar (iv) Ghea-Kunti basin drainage scheme in W.B (v) Tamluk basin drainage scheme in W.B (vi) Tons Advance bund in U.P (vii) Baidula Lakhanpar in U.P (viii) Urgent Development works of Sunderban area in W.B.

This year too, the monitoring reports of the above 8 schemes were taken up and are under progress. Out of these, monitoring reports in respect of two schemes namely Tamluk basin drainage scheme and Ghea-Kunti drainage scheme have been completed. Reports on the remaining 6 schemes would also be completed by the end of March, 2002.

Besides above, the following three centrally sponsored schemes were also monitored during the year.

- Maintenance of flood protection works of Kosi and Gandak Projects in Nepal portion.
- Flood proofing programme in North Bihar.
- Extension of embankments of Lalbakeya, Kamlia, Bagmati and Khando rivers (Presently the work of only raising and strengthening of embankments in Indian portion of Lalbakeya river is under progress)
- Critical anti-erosion schemes being executed by the states of Bihar, U.P and W.B.

Monitoring of floods in the Ganga basin

GFCC is monitoring the flood events of Ganga basin every year. Like previous years, flood monitoring of river system in Ganga basin was done during the monsoon of 2001, and 17 weekly flood reports were prepared by the GFCC and submitted to the Ministry. The Annual flood report for the year 2000 in respect of the Ganga basin was prepared and circulated to all concerned. Preparation of the Annual flood report for the year 2001 based on the information available in GFCC is likely to be completed during the year.

Performance evaluation of flood management schemes

During the year 1999-2000 the work on performance evaluation study of two completed schemes namely (i) Lucknow Town protection in U.P (ii) Mahananda embankment scheme in W.B was taken up. Out of these,
the performance evaluation of Mahananda embankment scheme in WB was completed during the year.

The draft final report for Lucknow Town protection scheme in U.P was under preparation. It is expected that report on this would be completed by the end of the year.

**Technical examination of flood management schemes**

Technical examination of the schemes is a continuing activity of the commission. During the year 2001-2002 (up to November, 2001) seven flood management schemes were examined and accepted. TAC (Technical Advisory Committee) notes for three schemes were sent to Advisory Committee on Irrigation Flood Control and Multipurpose Projects, with recommendations for acceptance, and 4 other schemes were sent to the Planning Commission for investment clearance. For 15 other schemes, pertaining to various Ganga basin states, comments were sent to the concerned state Government for compliance. It is expected that 20 more such schemes would be examined by the end of March, 2002.

**Technical examination of flood proofing schemes**

12 flood proofing schemes of North Bihar, are under examination and comments on them are being finalised for sending to the State Government.

**Presentation of Comprehensive plans prepared by GFCC to people’s representative and Government officials**

Up to March 2001 the Commission presented salient features of seventeen comprehensive plans of flood management namely Sone, Punpun, Mayurakshi, Jalangi, Burhi Gandak, Bagmati, Badua-Chandan, Gomati, Kiul-Harohar, Ramganga, Ajoy, Damodar, Adhwaar Group of rivers, Yamuna, Ghaghra, Rupnarain-Haldi-Rasulpur and Tons river systems to the Govt. officials and people’s representatives.

Action for presenting the main points of the comprehensive plan for flood management in respect of the Tidal river system in consultation with the concerned State Govt. officials is under progress during 2000-2001 and work on this is likely to be completed by the end of the year.

**Meetings**

31 meetings of the GFCC were held up to March, 2001. During the year 2001-2002. The 32nd meeting is proposed to be held by the end of March, 2002.

**Nepal-India Joint Team of Experts (JTE) on Sapta-Kosi High Dam Multipurpose Project**

The revised Inception Report (December 1999) for Joint Investigation Studies on Sapta Kosi High Dam Multipurpose project was examined and comments offered. Further, GFCC as a member of the Nepal-India Joint Team of Expert (JTE), participated in the 4th meeting of the JTE which was held at Kathmandu on 12-13 December, 2001, wherein the Inception Report was finalised.
FLOOD PRONE AREA OF VARIOUS GANGA BASIN STATES
(TOTAL = 20.40 M.HA.)

- Uttar Pradesh (7.34)
- Madhya Pradesh (0.26)
- Rajasthan (3.26)
- Haryana (2.35)
- Delhi (0.05)
- Himachal Pradesh (0.23)
- Bihar (4.26)
- West Bengal (2.65)
COMMITTEES

To study the erosion problem in the critical reaches between Buxar and Mokama

Keeping in view the complexity and severity of the bank erosion of the river Ganga in the reach between Buxar and Mokama in Bihar, the Government of India has set up a High Level Expert Committee for evolving a sustainable strategy to tackle this problem. The committee had been constituted under the Chairmanship of Sh.R.Ghosh, former Chairman, CWC. Member, GFCC is the Member-Secretary of the Expert Committee.

The report of the committee was completed and submitted to the Ministry of Water Resources for needful action in the matter.

Maintenance of flood protection works of Kosi and Gandak

The Kosi High Level Committee (KHLC) and Gandak High Level Committee (GHLC) under the leadership of the Chairman, GFCC, inspected flood protection measures taken for the Kosi and right bank of the Gandak and made recommendations for the protection works to be undertaken before the flood season of 2002.

Standing Committee on the inundation problem between India and Nepal

The Standing Committee on the inundation problem between India and Nepal was setup in the year 1986 in pursuance of the decision taken by the Prime Minister of India and his Majesty the King of Nepal during discussions on 8th December 1985, for dealing with the problems of inundation along Indo-Nepal border on a continuing basis. The leader of the Indian side is the Chairman, GFCC. 11 meetings of this committee were held up to March, 2001, in which issues relating to inundation problems between the two countries were discussed and decisions were taken to mitigate these. Efforts are on to hold the 12th meeting of the Committee and it is expected that the meeting of the committee would be held latest by the end of March, 2002.

Indo-Nepal Sub-Committee on embankment construction

The India-Nepal Joint Committee on Water Resources (JCWR) in its first meeting held in October, 2000 has decided to merge the Joint team of experts and the Joint committee on embankment construction to form the India-Nepal sub-committee on embankment construction. Accordingly, the Indo-Nepal sub-committee on embankment construction was constituted.

So far two meetings of the sub-committee have been held. The last meeting was held in April, 2001 in which various decisions regarding the construction of embankment on Lalbakeya, Bagmati, Kamla & Khando rivers were taken. The third meeting of the sub-committee would also be held by the end of March, 2002.

The work of raising & strengthening of embankment on the Lalbakeya river in India
and construction of embankment on this river in Nepal is under progress. The work on the Bagmati is to start soon.

Progressive use of Hindi

All possible efforts were made in the Commission for implementation of the provisions contained in the official languages act, 1963 and the rules made there under. All documents falling under section 3(3) of the above act were issued bilingually. Hindi-fortnight during September was also celebrated enthusiastically.

Vigilance/Disciplinary cases

Vigilance/disciplinary cases and the complaints concerning to officers and staff of GFCC received were properly and promptly redressed and there is no pending case in this regard.

Redressal of Staff Grievances

No staff grievances were received during the year (up to 31.12.2001).

STATEMENT SHOWING THE FINANCIAL REQUIREMENT
(For the year 2001-2002 & 2002-2003)

GANGA FLOOD CONTROL COMMISSION

Continuing works

(Rs. in lakh)

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<td>Salary</td>
<td>132.10</td>
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<td>2.</td>
<td>OTA</td>
<td>0.10</td>
<td>0.10</td>
<td>0.50</td>
</tr>
<tr>
<td>3.</td>
<td>TA (D) (F)</td>
<td>8.70</td>
<td>10.00</td>
<td>4.0</td>
</tr>
<tr>
<td>4.</td>
<td>OE</td>
<td>8.20</td>
<td>10.00</td>
<td>10.00</td>
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<tr>
<td>5.</td>
<td>M.W</td>
<td>34.68</td>
<td>27.80</td>
<td>35.55</td>
</tr>
<tr>
<td>6.</td>
<td>Machinery Equipment</td>
<td>23.20</td>
<td>20.85</td>
<td>30.95</td>
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<td><strong>Total</strong></td>
<td></td>
<td><strong>209.00</strong></td>
<td><strong>205.00</strong></td>
<td><strong>231.00</strong></td>
</tr>
</tbody>
</table>
CHAPTER 16

NATIONAL WATER DEVELOPMENT AGENCY

HIGHLIGHTS

- The feasibility report of Krishna (Nagarjunasagar)-Pennar (Somasila) Link has been completed and is planned to be circulated before March, 2002. The feasibility reports of another two links namely, Damanganga-Pinjal and Krishna (Almatti)-Pennnar are also programmed to be completed by March, 2002.

- Topographical surveys for preparation of feasibility reports of two links namely, Cauvery (Kattalai)-Vaigai-Gundar & Parbati-Kalisindh-Chambal were completed during the year.

- Topographical surveys for Pennar(Somasila)-Cauvery (Grand Anicut) link are programmed to be completed by March, 2002.

- Topographical surveys for preparation of feasibility reports of two links namely, Sarda-Yamuna and Ghagra-Yamuna (Indin territory) were completed.

- Topographical surveys for Chunar -Sone Barrage Link is programmed to be completed by March, 2002.

- Topographical surveys for 2 links namely, Subernarekha-Mahanadi & Rajasthan-Sabarmati were initiated during the year.

- Ninth National Water Convention was organized by NWDA and Government of Karnataka from 3rd to 5th November, 2001 at Bangalore.
THE AGENCY AND ITS OBJECTIVES

The National Water Development Agency (NWDA) was established in July, 1982 as an autonomous Society under the Societies Registration Act, 1860 under the Ministry of Water Resources to promote scientific development for optimum utilization of water resources in the country and for preparing feasibility reports for interbasin transfer of water from surplus to deficit areas as envisaged in the National Perspective for Water Resources Development. The Agency functions with the following main objectives:

(a) To promote scientific development for optimum utilization of water resources in the country.

(b) To carry out detailed field surveys and investigations of the possible storage reservoir sites and interconnecting links in order to establish the feasibility of the components of Peninsular Rivers Development and Himalayan Rivers Development of National Perspective for Water Resources Development prepared by the Ministry of Water Resources.

(c) To carry out detailed studies about the quantum of water in various Peninsular and Himalayan River Systems, which can be transferred to other basins/States after meeting reasonable needs of basin States in the foreseeable future.

(d) To prepare feasibility reports of various components of the schemes relating to Peninsular Rivers Development and Himalayan Rivers Development.

(e) To take all such other actions the Society may consider necessary, incidental, supplementary or conducive to the attainment of above objectives.

The Agency is headed by a Director General who is the Principal Executive Officer of the Society responsible for the proper administration of the affairs and the funds of the Society. The Agency has two field organizations, each headed by a Chief Engineer, 5 Circles each headed by a Superintending Engineer, 15 Divisions each headed by an Executive Engineer and 8 Sub-Divisions each headed by an Assistant Executive Engineer/Assistant Engineer.

The National Water Development Agency Society, the apex body of the National Water Development Agency, meets at least once a year under the Union Minister of Water Resources as its President to review the progress and performance of the Agency.

The Governing Body of the Society under the Chairmanship of the Secretary (Water Resources) meets at least once a year under the Union Minister of Water Resources as its President to review the progress and performance of the Agency.
Resources) manages, administers, directs and
controls the affairs and funds of the Society
subject to the bye laws, rules & regulations of
the Society and generally pursues and carries
out the objectives of the Society as set forth in
its Memorandum of Association and in doing
so, follows and implements the policy
directions and guidelines laid down by the
Society. The Governing Body meets at least
twice a year.

FINANCIAL ASPECTS

The budget allocation for the year 2001-2002
was Rs.15.00 crores and revised budget
estimate is Rs. 14.50 crores. The actual
expenditure incurred during the year 2000-
2001 was Rs.13.08 crores.

INTER BASIN TRANSFER OF WATER

NATIONAL PERSPECTIVE PLAN
PROPOSALS

The National Water Development Agency has
been carrying out studies of the National
Perspective Plan for water resources
development. The proposal comprises of two
components, namely, (a) Peninsular Rivers
Development and (b) Himalayan Rivers
Development.

PENINSULAR COMPONENT

The Peninsular Rivers Development is divided
into following four parts:

(i) Interlinking of the Mahanadi-Godavari-
Krishna-Pennar-Cauvery rivers.

(ii) Interlinking of the west flowing rivers
north of Bombay and south of Tapi.

(iii) Interlinking of the river Ken with
Chambal.

(iv) Diversion of the west flowing rivers of
Kerala and Karnataka to the east.

The work under this component comprises of
collection of data for 137 basins/sub-basins,
water balance studies of 137 basins/sub-
basins and at 49 identified diversion points,
toposheet & storage capacity studies of 58
identified reservoirs, toposheet studies of 17
links including identifications of command
area enroute, preparation of prefeasibility
reports of 17 links and survey and
investigations of 16 water transfer links for
preparing feasibility reports.

STUDIES UNDERTAKEN

Under the Peninsular Component, the National
Water Development Agency has completed
collection of data for all the 137 basins/sub-
basins, water balance studies of 137 basins/sub-
basins and 52 identified diversion points,
58 studies of identified storages, toposheet
studies of 18 links, and has prepared pre-
feasibility reports of all the 17 water transfer
links. The feasibility reports of 5 links have
been completed. The feasibility report of one
more link namely, Krishna(Nagarjunasagar)-
Pennar(Somasila) link has been completed and
is likely to be circulated before March, 2002.
The feasibility reports of another two links
namely, Damanganga-Pinjal and
Krishna(Almatti)-Pennar are also programmed
2001-2002

To be completed by March, 2002. The topographical surveys for preparation of feasibility report of two links namely, Cauvery (Kattalai) – Vaigai - Gundar & Parbati – Kalisindh - Chambal were completed during the year 2001-02. In addition to this, topographical surveys for Pennar (Somasila) – Cauvery (Grand Anicut) link are programmed to be completed by March, 2002. Besides, topographical surveys for preparation of feasibility reports in respect of three links namely, Mahanadi (Manibhadra)–Godavari (Dowlaiswaram), Godavari (Inchampalli Low Dam) – Krishna (Nagarjunasagar Tail Pond) and Godavari (Inchampalli)-Krishna (Nagarjunasagar) remained under progress.

During the year 2001-2002, special studies by other agencies of eight links namely, Mahanadi – Godavari, Krishna (Almatti) – Pennar, Damanganga – Pinjal, Parbati – Kalisindh – Chambal, Godavari (Inchampalli Low Dam) – Krishna (Nagarjunasagar Tail Pond), Cauvery (Kattalai) – Vaigai – Gundar, Pennar (Somasila) – Cauvery (Grand Anicut) and Godavari (Inchampalli) – Krishna (Nagarjunasagar) remained under progress.

HIMALAYAN COMPONENT

The Himalayan Rivers Development Component of National Perspective for water resources development envisages construction of storage reservoirs on the principal tributaries of Ganga and the Brahmaputra in India, Nepal and Bhutan alongwith interlinking canal systems to transfer surplus flows of the eastern tributaries of the Ganga to the west, apart from linking of the main Brahmaputra and its tributaries with the Ganga and Ganga with Mahanadi. It would also provide the necessary discharge for augmentation of flows at Farakka, to inter-alia, flush the Calcutta Port and facilitate inland navigation facilities across the country.

The work under this component comprises of water balance studies at 19 diversion points, toposheet studies of 16 reservoirs, toposheet studies of 19 water transfer links, preparation of prefeasibility report of 14 water transfer links and survey and investigations of 14 water transfer links for preparation of feasibility reports.

STUDIES UNDERTAKEN

Under the Himalayan Component, NWDA has completed water balance studies at 19 diversion points, toposheet studies of 16 storages, toposheet studies of 19 water transfer links and prefeasibility report of 14 links.

During the year 2001-2002, topographical surveys for preparation of feasibility reports of two links namely, Sarda – Yamuna and Ghagra – Yamuna (Indian territory) were completed. In addition to this, topographical surveys for the Chunar – Sone Barrage link is programmed to be completed by March, 2002. Besides, topographical surveys for preparation of feasibility reports in respect of 4 links namely, Manas – Sankosh – Tista – Ganga, Ganga – Damodar – Subernarekha, Yamuna – Rajasthan and Sone Dam – Southern Tributaries of Ganga remained under
progress. During the year, feasibility studies for 2 links namely, Subernarekha – Mahanadi & Rajasthan – Sabarmati were initiated.

During the year 2001-02, special studies by other agencies for seven links namely, Manas-Sankosh-Tista-Ganga, Sarda-Yamuna, Ghagra-Yamuna, Ganga-Damodar-Subernarekha, Yamuna-Rajasthan, Chunari-Sone Barrage and Sone Dam-Southern Tributaries of Ganga remained under progress.

The status of studies for Peninsular and Himalayan Components is shown in Figure I and Figure II respectively.

TECHNICAL ADVISORY COMMITTEE

The Technical Advisory Committee (TAC) of the National Water Development Agency under the Chairmanship of Chairman, Central Water Commission examines and scrutinises the various technical proposals framed by the National Water Development Agency. The TAC meets twice a year.

NATIONAL WATER CONVENTION

The Ninth National Water Convention was organized by NWDA & Government of Karnataka from 3rd-5th November, 2001 at Bangalore. During the Convention, themes of the last two years’ Water Resources Days i.e. “Human Issues Involved in Water Resources Development” for the year 2000 and “Management of Floods & Droughts” for the year 2001 were deliberated upon and recommendations drawn up and sent to Ministry of Water Resources for circulating to State Governments/Union Territories for adoption.

PROGRESSIVE USE OF HINDI

Maximum efforts have been made in the office for the progressive use of Hindi during the year regularly. Appropriate steps were taken for the implementation of the decisions taken in the meetings of Rajbhasha Karyavahan Samiti and the Sr. Officers’ Meetings.

Six regional offices located at Bangalore and Hyderabad were inspected during the year. During the inspection, use of official language in the routine office work was checked and an inspection report prepared. Report was sent to the concerned offices with suggestions/instructions after the approval of the DG, NWDA.

Hindi Pakhwara was organized from 14th to 28th September, 2001. Five competitions were held during the Pakhwara. Four prizes in each competition were awarded during the closing ceremony. All officers and staff actively participated in the programmes. All the regional offices also organized Hindi Pakhwara during Sept., 2001 and competitions were held. Four incentive schemes i.e. one for original noting/drafting in Hindi, second for writing technical articles in Hindi, third for giving dictation in Hindi and fourth for putting up complicated cases in Hindi were continued during the year. A new incentive scheme for Draftsmen was introduced this year. Four Workshop in Rajbhasha Hindi were held before March, 2002.
Figure 1

STATUS OF STUDIES FOR PENINSULAR COMPONENT

<table>
<thead>
<tr>
<th>Category</th>
<th>Total Number of Studies</th>
<th>Studies Completed</th>
<th>Studies Under Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection of Data</td>
<td>137137</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Balance studies of basins/sub-basins</td>
<td>137137</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Balance Studies of identified diversion points</td>
<td>49 52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studies of identified storages</td>
<td>58 58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toposheet studies of links</td>
<td>17 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefeasibility Report of Links</td>
<td>17 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility Reports of Links</td>
<td>16 6 8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure - II

STATUS OF STUDIES FOR HIMALAYAN COMPONENT

- Water Balance Studies of Identified Diversion Points: 19 (Total), 19 (Completed), 0 (Under Progress)
- Studies of Identified Storages: 16 (Total), 16 (Completed), 0 (Under Progress)
- Toposheet Studies of Links: 19 (Total), 19 (Completed), 0 (Under Progress)
- Prefeasibility Reports of Links: 14 (Total), 14 (Completed), 0 (Under Progress)
- Feasibility Reports of Links: 14 (Total), 0 (Completed), 9 (Under Progress)
Though situated in region ‘B’ & ‘C’, most of NWDA offices try to do appreciable work in Hindi. In future too, all efforts will be made to further improve the progressive use of Hindi in all offices of NWDA.

**VIGILANCE ACTIVITIES**

National Water Development Agency is following all the instructions issued from time to time by the Central Vigilance Commission regularly. Various fortnightly, monthly, quarterly, yearly returns and yearly evaluation of vigilance performance have been sent regularly to Ministry of Water Resources/ Central Vigilance Commission.

There is no pending Vigilance case in the NWDA as on date. There are 6 disciplinary cases pending in this Agency which are at various stages of inquiry/imposing penalty.

Short term orientation training on vigilance/disciplinary matters by NWDA was conducted from 11.07.2001 to 13.07.2001 at Allahabad for increasing efficiency of the NWDA offices.

Vigilance Awareness Week was celebrated from 31.10.2001 to 6.11.2001 by all the offices of the NWDA located all over the country including Headquarters. As per instruction of the Central Vigilance Commission, a pledge of integrity and honesty was administered on 31.10.2001 to all the officers & staff. Banners and Posters highlighting the evil of corruption were displayed at prime locations.

During the week, competitive lectures on “Education of Citizens and Their Rights and Role for Fighting Against Corruption” and “Behaviour of Central Government Employees in Office” were arranged on 5.11.2001 at NWDA (Headquarters), New Delhi and office of the CE(N), NWDA, Allahabad respectively in which various officials participated and gave their suggestions for checking/eliminating corruption in Government offices/Society in general.

Vigilance inspections of various field offices of NWDA were planned and completed.

**REDRESSAL OF STAFF GRIEVANCES**

There were no staff grievances pending during the year 2001-2002 in NWDA.
CHAPTER 17

NATIONAL INSTITUTE OF HYDROLOGY

HIGHLIGHTS

● More than 85 Research Papers were published in national and international journals, seminar/symposia, conferences etc.

● For fighting the flood menace, greater was is given on flood studies with the establishment of National Institute of Hydrology Centres for Flood Management Studies at Guwahati and Patna.

● For long term drought amelioration, proposals mooted for establishment of National Institute of Hydrology Centres for Drought Management Studies at Belgaum and Sagar.

● Extensive scientific studies were undertaken by the National Institute of Hydrology (NIH) to analyse and model the phenomenon of arsenic contamination in ground water in the affected areas of West Bengal.

● A number of studies were taken up in the North Eastern region on different aspects of Hydrology with focus on flood problems of the Brahmaputra Basin.

● Under the Hydrology Project, one Refresher Course and two Training courses on HYMOS and one Training Course on Basic Hydrology were held during the year for officers of Central/State Government organisations covered under the Hydrology Project.
THE INSTITUTE AND ITS FUNCTIONS

The National Institute of Hydrology (NIH) was established by the Government of India in December 1978 with its headquarters at Roorkee as an autonomous society, fully aided by the Ministry of Water Resources.

The Union Minister of Water Resources is the President of the NIH Society and the Union Minister of State of Water Resources is its Vice-President. The Ministers-in-Charge of Irrigation in the States (for ten States to be nominated for every three years by the President of the Society), the Secretaries of the Ministries in the Government of India concerned with water and related areas, and experts in hydrology and water resources are members of the Society. The Secretary, Ministry of Water Resources, Government of India, is the Chairman of the Governing Body. The Institute’s research and other technical activities are monitored and guided by the Technical Advisory Committee (TAC) headed by the Chairman, Central Water Commission. The Director of the Institute is appointed by the Government of India and he is the Principal Executive Officer of the Society.

In order to deal with the specific hydrological problems of different regions of the country and for providing effective interaction with the States, the Institute has set up regional centres of Hard Rock region, North Eastern region, Western Himalayan region, Ganga Plains (North), Deltaic and East Coast region and for Ganga Plains (South) at Belgaum, Guwahati, Jammu, Patna, Kakinada and Sagar, respectively.

Recently the North Eastern Regional Centre Guwahati and Ganga Plains Regional Centre, Patna have been renamed as National Institute of Hydrology Centres for Flood Management Studies for Brahmaputra and Ganga respectively.

OBJECTIVES

The main objectives for which the National Institute of Hydrology has been established are:

a) To undertake, aid, promote and coordinate systematic and scientific studies in all aspects of hydrology so as to improve the present practices in planning, design and operation of water resources projects;

b) To cooperate and collaborate with other national and international organisations in the field of hydrology;

c) To establish and maintain a research and reference library in pursuance of the objectives of the Society, and to equip this with books, reviews, magazines, and other relevant publications and;
Shri Arjun Charan Sethi, Hon'ble Union Minister for Water Resources addressing the 22nd Annual General Meeting of the NIH Society

Shri B.N. Navalawala, Secretary (Water Resources) & Chairman, Governing Body of NIH addressing Scientists of the Institute during his visit to NIH on 21st October, 2001
d) To do all other such things as the Society may consider necessary, incidental or conducive to the attainment of the objectives for which the Institute has been established.

**STUDIES AND RESEARCH**

The studies and research in the Institute are being carried out by the eighteen scientific divisions at Roorkee and the six regional Centres, broadly under the following major categories:

- Basic studies and research
- Applied studies and research
- Software Development
- Field and Laboratory oriented studies
- Sponsored and consultancy research

During 2001-2002, studies and research have been carried out in various areas of hydrology. Based on these eighty reports are being brought out. More than eighty-five papers have also been published in national and international journals and proceedings of national and international conferences/seminars and symposia.

Since the inception of the Institute, besides carrying out regular basic and applied research and development studies, the Institute and its regional centres have also taken up a few problems with emphasis on research content, which are specifically referred to it by the Central and State Government Organisations and Public Sector Undertakings. Also, a number of Central and State Governments are sponsoring research projects taken up by scientists of the Institute. During 2001-2002 work on nine ongoing projects was continued. Studies on two projects were completed and final reports submitted.

**NATIONAL INSTITUTE OF HYDROLOGY CENTRES FOR FLOOD MANAGEMENT STUDIES AT GUWAHATI AND PATNA**

Major flood affected areas of the country lie in the Ganga, Brahmaputra and Barak basins. Flood management and control are necessary not only because floods are the cause of great damage and hardship but also adversely affect the optimal exploitation of the land and proper management and control of water resources, which is of vital importance for bringing prosperity in the predominantly agriculture based economy of this diversely populated country.

The working group of the Planning Commission on Flood Management for the 10th Five Year Plan had noted that the efforts made so far by the Central and State Government organisations both by structural and non-structural measures are found to be inadequate in the management of floods, and emphasized that there is imminent need for strengthening these efforts. For fighting the flood menace, greater focus is being given on flood studies by the Ministry of Water Resources, Government of India. In view of this, MOWR has given its approval for the
establishment of the National Institute of Hydrology Centre for Flood Management Studies for Brahmaputra basin at Guwahati and Ganga basin at Patna.

Accordingly, the North-Eastern Regional Centre at Guwahati (Assam) has been renamed as the NIH Centre for Flood Management Studies for the Brahmaputra basin. Subsequently a Regional Coordination Committee meeting of the Centre was held at Guwahati on 14 July, 2001. Chairman, Brahmaputra Board and Commissioner (Policy & Planning), Ministry of Water Resources were present at this meeting to finalise the Five Year Work Programme of the Centre. Also the experts from the academic as well as field organisations of North-Eastern region were invited. Based on the deliberations and suggestions, the various technical and scientific activities of the Centre for the next five year have been finalised.

The North-Eastern Regional Centre, Guwahati was rededicated as Centre for Flood Management Studies for the Brahmaputra Basin on 27 September, 2001 by Smt. Bijoya Chakravarty, Hon’ble Union Minister of State for Water Resources, Government of India. On this occasion, a three days workshop on ‘Processing of Surface Water Data’ was organised by the Centre.
Further, the Ganga Plain North Regional Centre at Patna (Bihar) has been renamed as the NIH Centre for Flood Management Studies for the Ganga Basin. The Regional Coordination Committee meeting of the Centre was held at Patna on 4 September, 2001. Smt. Radha Singh, Commissioner & Secretary (Department of Water Resources), Government of Bihar, and Commissioner (Policy & Planning), Ministry of Water Resources were present at this meeting. The objective of this meeting was to finalise the Five Year Work Programme of the Centre. Experts from the academic as well as field organisations of the region attended the meeting. During this meeting, the five year work programme of the Centre has been finalised based on the deliberations and suggestions of the various proposed technical and scientific activities.

PROPOSALS MOOTED FOR ESTABLISHMENT OF NIH CENTRES FOR DROUGHT PROOFING AND MANAGEMENT STUDIES

It is being realised that the efforts, studies and research activities for understanding drought phenomena and for their effective management are inadequate towards planning and regional drought proofing. Research efforts are necessary in some important aspects of drought. Traditional prediction methodologies for water availability and demand are generally based on averages derived by statistical methods/analysis of past data. There is a need to develop modern techniques like expert systems and decision support systems for planning and management of drought strategies.

The frequent occurrence of drought in India necessitates drought management on a war footing. The Institute has done initial basic work in six drought prone states i.e. Andhra Pradesh, Madhya Pradesh, Karnataka, Gujarat, Rajasthan, Maharashtra and Orissa.

In view of the above, for long term drought amelioration, a proposal is under consideration for reorienting the focus of the NIH Regional Centres at Sagar and Belgaum as centres for carrying out Drought Proofing and Management Studies.

STUDIES TO ANALYSE AND MODEL THE PHENOMENON OF ARSENIC POLLUTION IN THE GROUND WATER OF SELECTED PARTS OF WEST BENGAL

The NIH and Central Ground Water Board, Eastern Region, Kolkata jointly carried out a study entitled, “Arsenic Pollution Study in Yamuna Sub-basin, Nadia and North 24-Parganas Districts, West Bengal”. The objectives of the study were:

i. to develop a ground water flow model for suggesting the well field, and to quantify the groundwater flow parameters.

ii. Development of a transport model to quantify the spatial and temporal variation of arsenic mobilization in the groundwater flow domain,

iii. Quantification of hydrological barrier to arrest the movements of contaminated plume.
An area covering 1465.00 sq.km in Nadia and North 24-Paraganas Districts of West Bengal has been considered for the study. The area is bounded by the river Baghirathi in the West, and the river Ichamati in the East and the river Yamuna forms a surface water drainage channel of this domain.

Groundwater flow model of the Yamuna sub-basin has been developed, and used for computing responses of the flow domain for other stress conditions including remedial measures.

As a remedial measure, artificial injection of water in the form of a battery of injection wells has been suggested to arrest the spreading of in-situ activation. The groundwater flow model of the Yamuna sub-basin can also be used to identify the locations of wells, which would draft arsenic free groundwater, in the flow domain.

**HYDROLOGY PROJECT**

The main role of the National Institute of Hydrology in the ‘Hydrology Project’, funded by World Bank, is to strengthen and expand the Institute’s capabilities for training to serve the important objectives in the Hydrology Project, namely (i) Modernisation and improvement of Data collection and processing procedures and (ii) use of computers and software for water data management. A major responsibility of the Institute would be to provide training for trainers in the required skills through short courses run at Roorkee and organising courses for data base managers and data base supervisors for use of the data processing software.

One Refresher Course and two Training courses on HYMOS and one Training Course on Basic Hydrology were held during the year for officers of Central/State Government organisations covered under the Hydrology Project.

Under the Hydrology Project work on the following demand driven Research and Development Projects is being carried out in collaboration with concerned state organisations :-

- Fresh Water- saline Water Inter Relationship in Multi-aquifer System of Krishna Delta in Andhra Pradesh.
- Estimation of Irrigation return flow in Lokapavani Area of K R Sagar Command in Karnataka.
- Artificial measures for Ground Water recharge in Alluvial and Hard Rock areas of Maharashtra.
- Data collection and processing for study on catchment area of the Upper Bhopal Lake and its ecosystem.

Scientists from NIH visited the study areas regularly and carried out the preliminary survey and field investigations. Modelling studies are under progress.

**INDIAN NATIONAL COMMITTEE ON HYDROLOGY (INCOH)**

The Indian National Committee on Hydrology (INCOH) was constituted by the Ministry of
Water Resources in the year 1982. It is an apex body with the responsibility of coordinating the various activities concerning hydrology in the country. The Chairman, Central Water Commission is the Chairman of the Committee, with members drawn from the Central and the State Governments as well as experts from academic and research organisations besides a few members drawn from non-governmental professional associations. The Committee gets a feedback from States and co-ordinates activities at the State level through State Coordinators. The Secretariat of the INCOH is with the NIH. The Committee has successfully fulfilled its role and made important contributions to hydrological activities in the country during the past nineteen years. The Committee brings out a bi-yearly journal entitled “Jal Vigyan Sameeksha” and also coordinates the International Hydrology Programme (IHP) of UNESCO in India.

During the year 2001-2002, the 25th meeting of the main INCOH was held on 6 July, 2001 at Roorkee under the chairmanship of the Chairman, CWC. A number of important decisions pertaining to India’s participation in IHP-VI (2002-2007) of UNESCO, organisation of 11th National Symposium on Hydrology, bringing out State of Art reports and progress of MOWR sponsored projects in Hydrology were taken. The 10th meeting of the INCOH Research Committee was held on June 15, 2001.

During the year, the Committee provided sponsorship to ten conferences, seminars, etc. Also two R&D projects sponsored by INCOH were completed and presently fifteen projects are in progress. During the year, three State-of-art reports have been published, and two issues of Jal Vigyan Sameeksha were brought. India is actively participating in the Fifth Phase of the IHP of UNESCO. The preparation for India’s participation in IHP-VI has also been initiated.

STUDIES AND RESEARCH FOR THE NORTH EAST REGION

The following studies and research were carried out by the NIH Centre for Flood Management Studies for Brahmaputra at Guwahati during the year 2001-2002:

PROJECTS PROPOSED

1. Surface Water Data Documentation and Processing for the Tributaries of Brahmaputra

The study is aimed at documentation of hydrometeorological data of different sub-basins of Brahmaputra basin. All the available data, such as daily/hourly rainfall, daily/hourly discharge, evaporation etc. is being collected from concerned agencies and is being stored in standard format for analysis and further processing. A hydrological data bank for the Brahmaputra will be established.

2. Development of Software for Floods Forecasting

The project is being considered by the Ministry of Water Resources with active participation of scientists from the NIH, Guwahati. One of the scientists from NIH Centre for Flood
Smt. Bijoya Chakravarty, Hon’ble Minister of State for Water Resources inaugurating the NIH Centre for Flood Management Studies at Guwahati on 27th September, 2001

Meteorological observatory set up by NIH at the Gangotri Glacier
Management studies, Guwahati is a member of the team formed by NIH to carry out the project work.

3. **Study of Fluoride Problems in Karbianglong Hill District of Assam**

The problem of fluoride contamination in some districts of Assam is alarming and has been prominently raised in media, workshops/seminars, and departmental reports and also in earlier Regional Coordination Committee meetings of the Centre. A joint study is proposed in project mode involving the NIH, Institute of Advanced Study in Science and Technology, Guwahati and PHE, Assam. A preliminary proposal has been submitted.

In addition to the above, the following studies have been carried out by NIH in the North East:

- Water Balance study of Krishnai Basin
- Dam Break Studies of Myntdu Leska Dam
- Development of Regional Flood Formula Using L-Moment for North Brahmaputra River Systems

Reports of the above were formally released by the Hon’ble Union Minister of State for Water Resources; and Secretary, Ministry of Water Resources, Govt of India at the function for rededication of NIH Regional Centre at Guwahati as the NIH Centre for Flood Management Studies (Brahmaputra Basin), Guwahati on September 27, 2001.

The following studies are under progress:

- Watershed prioritization of Jiadhal Basin through Remote Sensing and GIS
- Development of Geomorphological Instantaneous Unit Hydrograph (GIUH) for Jadukata basin
- Development of Geomorphological Instantaneous Unit Hydrograph (GIUH) for Kulsi Basin
Flood Frequency studies (at site) for Torsa River in West Bengal

Infiltration Studies for Greater Guwahati area

Ground Water Quality Monitoring in Terai Region with Special reference to trace elements.

AWARDS

The Institute has instituted two awards. The Bharat Singh Award is given biennially in recognition of significant research contributions in the area of hydrology. The National Hydrology Award is also given biennially for stimulating original research, organisation and promotion of research activities in operational hydrology.

Nominations for Bharat Singh Award for the year 1999 and National Hydrology Award for the year 2000 were invited.

FINANCE AND BUDGET

The Institute receives funds from the Ministry of Water Resources as grants-in-aid. The revised estimates of the Institute for the year 2001-2002 was Rs.3.21 crore under non-plan and Rs.2.30 crore under plan and for Hydrology Project it was Rs. 57.00 lakh.

USE OF HINDI

A number of programmes were organised by the Institute for implementing and promoting the use of Hindi language in various technical/administrative works.

Publications brought out in Hindi during this year were as follows:-

- Pravahini (literary in -house annual magazine)
- Preparation of a handbook about Hydrology in Hindi for school level is under progress. It is proposed to have demonstration-cum-lectures to be organised in schools.
- A number of technical papers were published by NIH scientists (in Hindi) in Journals.
- NIH Annual Report for the year 2000-2001 was brought out in Hindi.

VIGILANCE

During the year, there was no vigilance case requiring major or minor penalties. Vigilance inspections were made from time to time and necessary follow up measures were taken.

Vigilance Awareness Week was observed in the Institute during October 31 - November 6, 2001. The observance of Vigilance Awareness Week has helped in raising the level of the awareness of the employees of National Institute of Hydrology towards vigilance.

REDRESSAL OF STAFF GRIEVANCES

No staff grievances were received during the year.
CHAPTER 18

NARMADA CONTROL AUTHORITY

HIGHLIGHTS

● The Review Committee of the Narmada Control Authority (RCNCA) in its 9th meeting held on 17.8.2001 endorsed the decision of Narmada Control Authority (NCA) on the Irrigation By-Pass Tunnel (IBPT) and permitted its construction, subject to the condition that Government of Gujarat (GOG) shall compensate Government of Madhya Pradesh (GOMP), free of cost, for the loss of power due to running of IBPT, and the reservoir level shall not be depleted below the Minimum Draw Down Level (MDDL) of EL 110.64 m. The NCA shall evolve a mechanism to control and ensure that the reservoir water is not drawn through the IBPT below MDDL.

● The Authority in its 62nd meeting held on 4.5.2001 resolved the longstanding issue of sharing of cost of Hydromet Projects in Narmada basin. The party States viz. Governments of Gujarat, Maharashtra and Rajasthan have unanimously agreed to share the recurring/non-recurring expenditure related to hydromet project in the ratio of 44:40:15:1 respectively.

● 11907 project affected families have been allotted house plots and 11396 families allotted agricultural land. In all, 14904 families have been resettled up to October, 2001.

● Catchment Area of 1,43,145 ha. in Sardar Sarovar Project (SSP) and 47,893 ha. in Indira Sagar Project (ISP) has been treated up to October, 2001.

● Compensatory afforestation has been carried out in an area of 46,262 in SSP and 70,031 in Indira Sagar Project (ISP) up to October, 2001.

● Rationalised staff structure and recruitment rules were finalised in a special meeting of the NCA held on 20.11.2001.
NARMADA CONTROL AUTHORITY

CONSTITUTION, FUNCTIONS AND COMPOSITION

In pursuance of the decision of the Narmada Water Disputes Tribunal (NWDT) under Clause XIV of its final order, the Government of India framed the Narmada Water Scheme, which, inter alia, constituted the Narmada Control Authority and Review Committee, in 1980, for proper implementation of the decisions and directions of the Tribunal.

The Narmada Control Authority (NCA) has been vested with powers for the implementation of the orders of the Tribunal with respect to the storage, apportionment, regulation and control of the Narmada waters, sharing of power benefits from Sardar Sarovar Project (SSP), regulated release of water by Madhya Pradesh, acquisition of land likely to be submerged under the Sardar Sarovar Project by the concerned States, compensation, resettlement and rehabilitation of the oustees, and sharing of costs and implementation of the environmental safeguard measures.

The Authority is headed by the Secretary, Ministry of Water Resources, Government of India, as its Chairman, with Secretaries of the Union Ministries of Power, Environment and Forests, Social Justice and Empowerment and Tribal Welfare, Chief Secretaries of the four party States, one Executive Member and three full-time Members appointed by the Central Government, and four part-time Engineering Members nominated by the party States, as Members.

The Review Committee of the Narmada Control Authority (RCNCA) headed by the Union Minister of Water Resources can suo-moto or on the application of any party State or Secretary to the Government of India, Ministry of Environment and Forests, review any decision of the Authority. In urgent cases, the Chairman of the Review Committee can, on an application of the Government of any party State, or the Secretary to the Government of India, Ministry of Environment and Forests, grant stay of any order of the Authority pending final decision or review.

MEETINGS

The 9th meeting of the Review Committee of Narmada Control Authority (RCNCA) was held on 18 August, 2001. The Narmada Control Authority held two meetings during the year (62nd meeting on 4th May & 63rd meeting on 20 Nov., 2001) in which issues relating to resettlement and rehabilitation, environment of the Sardar
Sarovar Project and other project related matters were discussed. A special meeting of the Authority was held on 20th Nov, 2001 to finalize the rationalized staff structure for NCA and recruitment rules.

IMPORTANT DECISIONS TAKEN

62nd and 63rd NCA Meetings

1. The recurring/non-recurring cost for the Hydromet Network in the Narmada basin, which is being implemented by NCA, is to be shared by the party States of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan in the ratio of 44:40 : 15:1 respectively. A resolution to this effect was passed unanimously in the NCA. This is an important achievement as the issue of sharing the cost of Hydromet Network was pending since 1990.

2. The authority agreed with the views of the dam safety panel regarding the technical necessity of providing humps at EL +90 m. over the truncated spillway of Sardar Sarovar Dam, after obtaining the opinion of Attorney General of India on the legal aspects on providing humps. In the light of the directions of the Hon’ble Supreme court for raising of the height of the dam, the authority permitted construction of 3.00 m. high humps over the truncated spillway blocks No. 31 to 45 (leaving two end blocks i.e. No. 30 and 46 without humps) of Sardar Sarovar Dam with the condition that the Project authorities would maintain the reservoir level in Sardar Sarovar at or below EL 90 m. in the non-flood season. This timely decision helped in construction of the dam before the onset of monsoon as per action plan.

3. Action plan for construction of Sardar Sarovar Project: As per the direction of the Hon’ble Supreme Court the following implementation plan has been drawn up pari passu with the Rehabilitation and Resettlement for completion of the dam.

<table>
<thead>
<tr>
<th>Dam Height (EL) (Afflux)</th>
<th>Development of all civic amenities and keeping in readiness developed agricultural land and house plots with core houses at R&amp;R sites and allotment of land and house plots to PAFs by NCA after getting the clearance of R&amp;R and Env. Sub-groups by and</th>
<th>Completion of construction subject to approval of Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 m. (112.75 m)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
4. The authority reviewed the implementation of the resettlement & rehabilitation measures being implemented by the party States according to the action plan drawn by the NCA. The party States, were advised suitably to accelerate the pace of implementation so as to achieve the action plan targets set by the NCA/RCNCA.

Review Committee (RCNCA) Meetings

1. The RCNCA endorsed the decision of NCA for providing the Irrigation By Pass Tunnel (IBPT) at SSP, and its construction is to be completed, and the Government of Gujarat (GOG) shall compensate for the loss of power due to running of IBPT, which will be calculated in million units and the reservoir water level shall not be depleted below the Minimum Draw Down Level (MDDL) of EL 110.64 m. The NCA shall evolve a mechanism to control and ensure that the reservoir water is not drawn through the IBPT below the MDDL. The RCNCA, under the chairmanship of Hon’ble Union Minister of Water Resources achieved this important breakthrough in solving the long pending issue.

2. The Ministry of Power will explore the possibility of extending the scheme of meeting the resource gap to Government of Madhya Pradesh (GOMP) in the ratio of 1.28:1 (GOMP:GOI) towards their share cost for the power portion of the Sardar Sarovar Project depending on the size of 10th five year plan.

3. The Government of Gujarat (GOG) shall provide sufficient funds to the Government of Madhya Pradesh (GOMP) for additional expenditure on R&R as per the understanding reached between the two States.

SUB-GROUPS/ SUB-COMMITTEES

The Authority had constituted the following discipline based sub-groups:

1. Resettlement and Rehabilitation Sub-Group under the Chairmanship of Secretary, Union Ministry of Social Justice and Empowerment.

2. Environment sub-group under the Chairmanship of Secretary, Union Ministry of Environment & Forests.

3. Rehabilitation Committee under the
Chairmanship of Secretary, Union Ministry of Social Justice and Empowerment.

4. Narmada Main Canal Sub-committee under the Chairmanship of the Executive Member, Narmada Control Authority.

5. Hydromet Sub-group under the Chairmanship of the Executive Member, Narmada Control Authority.

6. Power Sub-committee under the Chairmanship of Member(Power), Narmada Control Authority.

Three meetings of the Resettlement and Rehabilitation Sub-group, one meeting each of Environment Sub-group and Power Sub-committee were held till the end of December, 2001.

MONITORING OF PROJECTS

As per Sub Clause 8(3)(ii) of Clause-XIV of NWDT award, the Authority shall decide the phasing and shall co-ordinate construction programmes of Narmada Sagar Project (NSP) & Sardar Sarovar Unit II-Canals with a view to obtaining expeditiously optimum benefits during and after the completion of the construction of the projects, having due regard to the availability of funds. In compliance of these directions, the NCA has been monitoring the Indira Sagar Project and Unit II – Canals of SSP and bringing out half yearly status reports for the period ending September and March of each year. The reports for the period ending 31st March & 30th September, 2001 in respect of these two projects were brought out by the NCA.

RESETTLEMENT AND REHABILITATION ACTIVITIES

The Resettlement and Rehabilitation policy for the affected persons of Sardar Sarovar Project (SSP) is based on the decisions and final orders of the Narmada Water Disputes Tribunal (NWDT) Award. Considering the socio-economic and cultural background of the population being displaced and with a view to improving the living conditions of these people, all the three participating States have formulated their own policies which contain more liberal provisions than those envisaged in the Narmada Water Disputes Tribunal (NWDT) Award.

The R&R progress is being closely monitored effectively by the monitoring machinery i.e. Resettlement & Rehabilitation (R&R) Sub-group of the Narmada Control Authority, Chaired by the Secretary to the Government of India, Ministry of Social Justice and Empowerment. In addition, a Rehabilitation Committee headed by the Union Secretary for Ministry of Social Justice and Empowerment also makes field visits to the submergence villages and R&R sites and the observations/suggestions of the Committee are being complied with by all the party States.
The project affected families are also provided subsistence allowance, rehabilitation grant, ex-gratia, productive assets, insurance cover and civic amenities like primary schools, dispensaries, children park, panchayat ghar, religious places, tree platforms, wells, hand-pumps, transit sheds, electrification, etc. and employment to some of them.

### ENVIRONMENTAL SAFEGUARD MEASURES

The environmental clearance of the Indira...
Sagar Project (ISP) and Sardar Sarovar Project (SSP) from environmental angle was granted by the Ministry of Environment & Forest, Govt. of India on 4.6.1987. The Environmental safeguard (ESG) measures were to be planned for implementation pari-passu with the progress of construction of dam. The NCA was entrusted with the monitoring works. For effective monitoring of implementation of ESG measures, the NCA has constituted a sub-group on environment. The environment sub-group which is chaired by the Secretary, MOEF monitors the survey / studies and implementation of the environmental safeguard measures and their efficacy. A series of studies and impact analyses were carried out for detailed programming and implementation of the environment safeguard measures to mitigate identified negative impacts in reservoir, command, and downstream area as well as the estuary. The Present status of key concerns is as follows:

1) **Phased Catchment Area Treatment Scheme (CAT)**: CAT works were completed in Gujarat and Maharashtra. In M.P. the CAT works are expected to be completed in 4 years. The cost of CAT of directly draining sub-watersheds is being borne by the project. The cumulative progress of CAT was 1,43,145 ha. against the target of 1,79,180 ha. in SSP and 47,893 ha. against the target of 62,975 ha. in ISP.

2) **Compensatory Afforestation**: Approval for diversion of forest land for SSP and ISP was granted by MOEF in 1987 subject to the condition that CAF for every ha. of forest land submerged or diverted for construction of the project, there should be compensatory afforestation on one ha. of non forest land plus reforestation on two ha. of degraded forest. The cumulative progress of CAF works was 46,262 ha. against the target of 46,355 ha. in SSP and 70,031 ha. against the target of 80,945 ha. in ISP have been achieved up to October, 2001.

3) **Command Area Development**: A large No. of studies have been undertaken by the project authorities for development of Command area under SSP. Most of the studies are now complete. It is planned to complete the on field development (OFD) works in the command area pari-passu with the construction of the canal system. Plans for development of Command area works under ISP are under revision by Government of Madhya Pradesh (GOMP).

4) **Flora, Fauna & Carrying Capacity**: Studies have been carried out and completed by all the party states. Field surveys for terrestrial flora & fauna were conducted for identifying rare and / or endangered species for devising appropriate conservation measures. The main emphasis was on the conservation of endangered species, provision of migratory corridors and improving the sustaining capacity of the surrounding areas. Action plans are under advanced stage of implementation.
5) **Seismicity and rim stability**:

**Sardar Sarovar Project**: A Dam Safety Panel advises on specific design issues referred and its recommendations are incorporated in the dam design. Recently the seismic design aspects were reviewed by the panel after the Bhuj earthquake and it confirmed the adequacy of designs and dam safety. Studies of Reservoir Induced Seismicity (RIS) and Rim stability have been carried out by the Geological Survey of India (GSI), CWPRS, Pune, University of Roorkee & the World Bank Consultant. Construction & instrument installation works are completed at all the 9 identified seismic monitoring stations. Analysis of data collected by these observatories is done by the expert institutions.

**Indira Sagar Project**: In order to study the effects of seismicity on the dams of the Narmada Sagar Complex, a network of 10 seismological observatories with sophisticated instruments has been established based on the recommendations of the Dam Review Panel, Central Water and Power Research Station, (CWPRS) Pune and the Indian Meteorological Department (IMD) for monitoring pre and post impoundment seismicity in the vicinity, with the view to assess the adequacy of seismic parameters adopted for designs.

6) **Health Aspects**: A large no. of studies have been carried out on the health profile of villages in three affected states. Substantial work has been carried out to identify health risk and disease within the affected areas of the SSP & ISP. Project authorities have prepared an action plan on health aspects to provide necessary health facilities at the dam site for people around the periphery and at the relocation sites. The plans are under implementation.

7) **Archaeology and Anthropology**: Based on extensive survey and studies carried out by archaeologists, anthropologists of repute to preserve the rich cultural heritage of Narmada valley, the works for relocation of ancient monuments, excavation of mounds, documentation of pre-historic sites etc. have been undertaken.

### ENERGY MANAGEMENT CENTRE OF NARMADA CONTROL AUTHORITY

An Energy Management Centre (EMC) is being set up by the Narmada Control Authority at Indore to monitor the sharing of Power generated at Sardar Sarovar Project by the party states. The total work of the EMC, estimated to cost Rs.3.69 crores, was divided into four packages. Package I, awarded to BHEL, comprises of microprocessor based Remote Terminal Units (RTUs). The RTU at Canal Head Power House (CHPH) has been installed and precommissioning tests carried out. Package II, also awarded to BHEL, comprises of Supervisory Control And Data Acquisition system (SCADA) equipment, associated software and communication equipment.
SCADA equipment at Energy Management Centre (EMC), Indore and Western Region Load Despatch Centre (WRLDC), Mumbai has been installed and data transfer between EMC and WRLDC has been tested over a leased data circuit. Package III, comprises auxiliary equipment like Uninterrupted Power Supply System (UPS), Diesel Generator (DG) Set, air conditioning etc. All the equipment under this Package have been installed at EMC and work completed. Package IV, awarded to M/s. Intrax, comprises of Time of the Day (TOD) metres. All the equipment under this Package have been received and will be installed at the River Bed Power House (RBPH) control room when it is ready.

**HYDROMET NETWORK IN NARMADA BASIN**

NCA has been entrusted by the party States to carry out implementation of the Hydromet network which, inter alia, comprise setting up of 7 key Gauge Discharge & Silt (GDS) stations, upgradation of equipments at Gauge & Discharge (GD) sites of CWC & State Government and setting up a Real Time Data Acquisition System (RTDAS) in the Narmada basin. The upgradation of GD sites has already been accomplished whereas the running and maintenance of 7 GDS sites of the NCA have been given on deposit work basis to Central Water Commission.

*Photo: Smt. Bijoya Chakravarty, Union Minister of State for Water Resources visiting NCA at Bhopal—Jabalpur in June, 2001*
Parliamentary standing committee inspecting Dam site of Sardar Sarovar Project during their visit to the Dam site in Sept. 2001.

Parliamentary standing committee watching the Model of Sardar Sarovar Project during their visit to the Dam Site in Sept. 2001.
In respect of RTDAS, a contract on turnkey basis was signed with M/s ECIL in September, 1996 for an amount of Rs. 12.85 crore for implementation of Real Time Data Acquisition System (RTDAS) Network comprising 26 Remote Stations (RS) and a Master Control Centre (MCC) located at Indore. The Remote Stations depending upon their configurations will automatically collect and transmit to Master Control Centre (MCC) via INSAT-2B various hydro meteorological data such as water level, rainfall, evaporation, radiation wind speed and direction, relative humidity and ambient temperature. The MCC at Indore has been established, and 20 out of the 26 Remote Sensing Stations have been energized to receive the data through INSAT-2B and the remaining 6 stations are at various stages of installation. The software for the Water Management System including flood forecasting and integrated reservoir operations in the Narmada basin is under development. The Project is at an advanced stage of implementation and likely to be tested during the monsoon of 2002. The RTDAS on completion will be useful in giving early flood warning for safety of various major dams including SSP & ISP on river Narmada and related software will help in proper apportionment of Narmada Water among the beneficiary states.

ANNUAL WATER ACCOUNT OF NARMADA BASIN

According to the orders contained in the Sub clause – 8 of the Clause-XIV of the NWDT award, NCA has been preparing Annual Water Account for the Narmada basin by collecting from the state concerned the data on areas irrigated by Narmada waters in each season, withdrawals for domestic, municipal, industrial or any other purposes. The Authority has also been mandated by the award to determine the Volume of water flowing in the river Narmada and its tributaries in a water year (1st July to 30th June). Annual Water Accounts up to the year 1998-99 have already been finalize & published by the Authority and draft of the same for the water year 1999-2000 is under finalization. A manual for preparation of the Annual Water Account in accordance with the direction of NWDT was finalized by the hydromet sub group of NCA.

PARLIAMENTARY STANDING COMMITTEE VISITS SSP

A study group of Parliamentary Standing Committee on Agriculture, headed by Shri Raghunath Jha visited the Sardar Sarovar Project (SSP) from September 20th to 23rd, 2001. The team consisting of 11 members of Parliament and three secretarial officers visited the model room, dam site, River Bed Power House (RBPH) and Canal Head Power House (CHPH), Canal Head Regulator in the Sardar Sarovar Project (SSP) area. The team also visited two R&R sites namely Kherwadi II and Saidal.

Shri H.K. Javare Gowda, chaired the discussion and question answer session held on 22nd September, 2001 at Vadodara. Minister for Agriculture, GOG, Chairman, Vice Chairman and Senior officers of SSNNL, SSPA, NCA, SSCAC, and CWC were present at this discussion and question answer session.
The committee will submit its report to the parliament.

**BUDGET AND FINANCE**

The expenditure incurred by the Authority on office expenses, construction of buildings for staff quarters/office complex and setting up of Energy Management Centre is to be borne out of the Narmada Control Authority fund, contributions to which are made by the participating States of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan in equal proportion. The recurring/non recurring expenditure related to the Hydromet project being implemented by the NCA is shared in ratio of 44:40:15:1 by the Governments of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan respectively.

**REDRESSAL OF STAFF GRIEVANCES**

No staff grievances are pending in the Authority.
HIGHLIGHTS

- The Sardar Sarovar Construction Advisory Committee (SSCAC) has been set up as per directives of the Narmada Water Disputes Tribunal (NWDT) to ensure efficient, economical and early execution of Unit-I (Dam and Appurtenant works) and Unit-III (Hydro Power works) of the Sardar Sarovar Project.

- The SSCAC scrutinizes various estimates, technical features, contracts and monitors the progress of construction of Sardar Sarovar Dam.

- The Block Nos. 30 to 46 of Sardar Sarovar dam raised from the level of 85.0 m to 90.0 m and 3.0 m high hump constructed on the Block No. 31 to 45.

- A decision was taken by the SSCAC/Permanent Standing Committee (PSC) to expedite the preparation of revised estimate of Unit-I and Unit-II works of Sardar Sarovar Project at 2000-2001 price level.

COMPOSITION AND FUNCTIONS

The Sardar Sarovar Construction Advisory Committee (SSCAC) was constituted in 1980 by the Government of India in accordance with the directives of the Narmada Water Disputes Tribunal (NWDT) with a view to ensure efficient, economical and early execution of Unit-I (Dam and Appurtenant works) and Unit- III (Hydro Power works) of the Sardar Sarovar Project.

The Secretary, Government of India, Ministry of Water Resources, is the Chairman of the Committee. The officers of the departments like Irrigation, Power, Revenue, Welfare etc. concerned with the construction of the project, of the four party States viz. Gujarat, Maharashtra, Rajasthan and Madhya Pradesh, along with their counterparts from the Government of India and the Narmada Control Authority, are Members of the Committee. The Committee has a full time Secretary in the rank of the Chief Engineer from the Central Water Commission. The secretariat of the Committee is located at Vadodara.

The Important functions of SSCAC are as follows :-

i) Scrutinise the project estimates prepared for Unit-I and Unit-III works, advise necessary modifications and recommend the estimates for the administrative approval of the concerned Government.

ii) Examine and make recommendations on all proposals pertaining to technical features and designs, including specification, and the programme of construction of different parts of the project in a co-ordinated manner keeping in view the funds available, the economics of the project and the desirability of obtaining quick results.

iii) Examine the requirement of funds for the construction of works and other purposes according to the approved programme and make necessary recommendation.

iv) Examine and recommend, from time to time, the delegation of such powers, both technical and financial, as may be deemed necessary for the efficient execution of the works on the project, to the officers engaged in the execution of the project.

v) Examine and make recommendations on all sub-estimates and contracts, the cost of which exceeds the powers of sanction of the General Manager/Chief Engineers.
vi) Review progress reports, both for works and expenditure, from the General Manager/Chief Engineers and recommend, where necessary, steps to be taken to expedite the work.

IMPORTANT DECISIONS

One meeting of SSCAC (67th) was held on 3rd May 2001.

a) The committee approved the construction of 3.0 m high hump over truncated spillway blocks No. 31 to 45 of Sardar Sarovar Dam (completed upto Elevation Level (EL) 90.0m) before the monsoon of 2001.

b) The Committee requested Government of Madhya Pradesh (GOMP), Government of Maharashtra (GOM) and Government of Rajasthan (GOR) to expedite the Payment of undisputed share cost of Sardar Sarovar Project to Government of Gujarat.

The Second meeting of SSCAC (68th) likely to be held in February, 2002.

PERMANENT STANDING COMMITTEE

The Sardar Sarovar Construction Advisory Committee (SSCAC) has a sub committee named the Permanent Standing Committee (PSC), with the Executive Member, Narmada
Control Authority as the Chairman, and representatives from the Ministry of Water Resources, Central Water Commission, Central Electricity Authority and all the four party States as Members. The Secretary, SSCAC, is the Member Secretary of the PSC. All the matter requires attention/approval of SSCAC are first put up to this sub-committee. Some of the powers of the SSCAC are delegated to this sub-committee and if matters are beyond the power of the PSC then examines it before recommending to SSCAC. Two meetings of the PSC (83rd & 84th) were held on 24th May 2001 and 12th December 2001. The third meeting of the PSC (85th) is likely to be held in February, 2001.

The following important decisions were taken by the PSC during 2001-2002.

a) The claim of M/s. IHP Ltd. For idle and under utilization of the manpower and machinery deployed for the work of fabrication and installation of six steel penstocks for under ground river bed power house of Sardar Sarovar Project was finalized and approved for payment of Rs. 48.91 lakh.

b) The Government of Gujarat (GOG) was asked to complete the preparation of revised estimates of Unit-I Unit-II works at the 1996-67 and 2000-2001 price levels. The committee decided that no change could be made in the time frame finalized by the 66th SSCAC and GOG should expedite completion of the estimates within the stipulated time frame.

c) The Committee decided that the GOG should submit a revised Annual Development Plan (ADP) to the SSCAC after deleting the item of Irrigation Bye Pass Tunnel (IBPT) within a fortnight, and with reference to Unit-I and Unit – III works such as R&R works, raising of dam height as per the action plan decided by NCA/RCNCA, and the targets for completion of RBPH works as given in RIS-3/2000 prepared by GOG. The GOG should not keep provision for the items, where the approval for taking up such work is pending with SSCAC/NCA/RCNCA. The revised ADP 2001-2002 would be discussed in the meeting of the representatives of party states to be arranged by the Secretariat after receipt of this from GOG and put up to the Committee for approval.

d) On the Revised Implementation Schedule for Underground River Bed Power House (RIS- March 2000), the GOG was asked to work out an estimate of the interest/obligations as suggested by the GOMP. The GOMP was asked to send their observations in writing to GOG and Sardar Sarovar Construction Advisory Committee so that GOG could examine the issues raised and modify the Revised Implementation Schedule (RIS), wherever necessary. The Committee, decided to defer the discussion on this item.

e) Two draft tender documents viz. one for procurement of 24 KV isolated
View of 3.0 m high hump at EL 90.0 m of the Dam.

Birdseye View of Sardar Sarovar Dam
phase Bus Ducts with its terminal equipments for River Bed Power House, and the other for supply and supervision of erection of 6 three Phase 250 MVA, 13.8/420 KV Generator Motor transformer for River Bed Power House were scrutinized and comments given to the Government of Gujarat for incorporating/revising the documents.

MAIN DAM PROGRESS OF WORKS

The Sardar Sarovar Dam was programmed to be raised to a minimum elevation of 110.00 m during the year 1996-67 for achieving partial benefits of irrigation and power, as decided by the Sardar Sarovar Construction Advisory Committee. However, this could not be achieved on account of the court case of the Narmada Bachao Andolan (writ petition (C) No. 319 of 1994) in the Supreme Court of India. Earlier, the minimum level of spillway blocks No. 30-46 was maintained at EL 80.3 m in view of the restrictions imposed by the Supreme Court judgment dated 5th May, 1995, and later these blocks were raised to the level of 85.0 m on the basis of the Supreme Court judgement dated 18th February, 1999.

On 18th October, 2000 the Supreme Court gave the final judgment in the case of Narmada Bachao Andolan, wherein the directions were given to construct the dam as per the award of the ‘Narmada Water Disputes Tribunal’. The Court also permitted to raise the height of the dam up to RL 90.00 m. The permission for further raising of dam is now to be given by the NCA after obtaining clearance from the Resettlement and Rehabilitation Sub-group and the Environment Sub-group and in consultation with the Grievance Redressal Authorities (GRA’s ) of Gujarat. Maharashtra and Madhya Pradesh.

On 31st October 2000 the work started on the blocks Nos. 30 to 46 to raise them to the level of 90.00 m. The quantity of concrete involved for raising of these blocks to 90.0 m was 108681 Cu.m A 3.0 m high hump has also been constructed to avoid damage of the stilling basin on Block No. 31 to 45.

The position of overall progress of main dam works as the end of November, 2001 is as under:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Est Qty.</th>
<th>Work completed</th>
<th>% Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation (Thousand Cu.m)</td>
<td>6400</td>
<td>6335</td>
<td>98.98</td>
</tr>
<tr>
<td>Concrete (Thousand Cu.m)</td>
<td>6820</td>
<td>5960</td>
<td>87.39</td>
</tr>
</tbody>
</table>

CANAL HEAD POWER HOUSE

Civil and Electrical works of the Canal Head Power House have been completed, and all the five units each of 50 MW capacity are ready for commissioning. The units will be commissioned when the dam height reaches to the level of 110.64 m.
RIVER BED POWER HOUSE

The work on the River Bed Power House was held up due to development of a stress zone in the power house cavern and non receipt of embedded parts for the Turbine Generator (T.G.) sets owing to some contractual problems. The issue of supply of T.G. sets was resolved with the signing of a fresh agreement with M/s. Sumitomo Corporation of Japan. The raised price of the supply contract is 23194.71 million Yen + Rs. 96.23 crores. The supply of T.G. sets has commenced and material worth 14857.00 million Yen has been received at site. The work of further excavation in the River Bed Power House cavern and concreting have also commenced, and the status of progress of civil work at the end of November, 2001 is as under.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Est.Qty.</th>
<th>Work completed</th>
<th>% Progress</th>
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</thead>
<tbody>
<tr>
<td>Open Excavation (Th. Cu.m.)</td>
<td>1715</td>
<td>1663</td>
<td>96.96</td>
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<tr>
<td>U.G.Excavation (Th. Cu.m.)</td>
<td>718</td>
<td>616</td>
<td>92.66</td>
</tr>
<tr>
<td>Concrete (Th.Cu.m.)</td>
<td>312</td>
<td>242</td>
<td>77.44</td>
</tr>
<tr>
<td>Shotcreting (Th.Cu.m.)</td>
<td>207</td>
<td>183</td>
<td>88.61</td>
</tr>
<tr>
<td>Rock bolting (R.Cu.m.)</td>
<td>170</td>
<td>130</td>
<td>76.37</td>
</tr>
</tbody>
</table>
The first unit of the River Bed Power House (RBPH) is expected to be completed by March 2003, while work of all the six units are likely to be completed by November 2004.

Fulfilling the requirement of the direction of the Supreme Court, the Narmada Control Authority, in its 61st meeting finalized the Action Plan for the construction of Sardar Sarovar Dam, and R&R measures. This action plan was also approved by 8th Review Committee of Narmada Control Authority (RCNCA) held on 10th January, 2001. As per the Action Plan, the time frame for R&R and Dam construction activities for different dam heights are as under.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Dam Height (EL)</th>
<th>Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100.00 m</td>
<td>December 2001, June 2002</td>
</tr>
<tr>
<td>2</td>
<td>110.00 m</td>
<td>December 2002, June 2003</td>
</tr>
<tr>
<td>3</td>
<td>121.00 m</td>
<td>December 2003, June 2004</td>
</tr>
<tr>
<td>4</td>
<td>138.68 m</td>
<td>December 2004, June 2005</td>
</tr>
</tbody>
</table>

**IRRIGATION BY-PASS TUNNEL (IBPT)**

The IBPT arrangement comprises of two 5.50 m diameter tunnels with invert level at EL 88.39 m with a discharge capacity of about 15,000.00 cusecs at reservoir level of 110.76 m. The project authorities have constructed the first tunnel of 4.00 m excavated diameter, with invert level at 88.39 m and 188.00 m length, involving about 3000.00 cum of rock excavation. This excavated tunnel was used for augmenting drinking water supply to Gujarat by pumping water from the reservoir of Sardar Sarovar Project in the month of February and March 2001. The work of excavation of the second tunnel (with estimated length of about 189.00 m) with full excavation diameter of 7.50 m and invert level of 88.39 m has also been taken up and completed for a length of 121.00 m from the down stream (d/s) end and 38.00m from the up stream (u/s) end, leaving a rock ledge of about 30.00 m length. Further work of excavation and concreting in both tunnels is in progress. The invert concrete lining for this tunnel in a length of 108.00 m has been completed. The excavation work of the vertical shafts for providing emergency gates has also been taken up on both the tunnels and is under progress.

**VISIT OF VIPs TO THE PROJECT**

The parliamentary standing committee (Group-II) on Agriculture having 11 MP’s...
visited the Sardar Sarovar Project from 21st September, 2001 to 22nd September, 2001. The other VIP’s who visited the project are listed below.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name &amp; Designation of VIP</th>
<th>Visit Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shri Justice Daud, Chairman of the R&amp;R team from Govt. of Maharashtra.</td>
<td>17.5.2001 to 20.5.2001</td>
</tr>
<tr>
<td>2</td>
<td>Smt. Asha Das, Secretary to Govt. of India, Ministry of Social Justice &amp; Employment.</td>
<td>18.6.2001</td>
</tr>
<tr>
<td>3</td>
<td>Shri H.K. Patil, Hon’ble Minister (Water Resources) Govt. of Karnataka.</td>
<td>30.6.2001</td>
</tr>
<tr>
<td>4</td>
<td>Shri Sunder Singh Bhandari, Governor of Gujarat</td>
<td>6.7.2001</td>
</tr>
<tr>
<td>5</td>
<td>Smt. J. Mehta, Hon’ble MOS (Power) Govt. of India.</td>
<td>15.7.2001</td>
</tr>
<tr>
<td>6</td>
<td>Shri B.N. Navalwala, Secretary to Govt. of India, Ministry of Water Resources.</td>
<td>5.8.2001</td>
</tr>
</tbody>
</table>

**PROGRESSIVE USE OF HINDI**

All the officers and staff of Sardar Sarovar Construction Advisory Committee are trained to work in Hindi and most of the work is done in Hindi.

**VIGILANCE CASES**

No vigilance case is pending or contemplated against any officer or staff of the Secretariat of Sardar Sarovar Construction Advisory Committee.

**BUDGET AND FINANCE**

The expenditure of the SSCAC is first allotted by MOWR under the non plan head and then reimbursed equally by four party i.e. Gujarat, Madhya Pradesh, Maharashtra and Rajasthan. The
expenditure for the year 2000-2001 was Rs. 35.95 lakhs.

**REDRESSAL OF STAFF GRIEVANCES**

Only three grievances from the staff of the SSCAC in regard of T.A. bills, revision of pay scale and non declaration of Permanency in the post are pending with the Sardar Sarovar Construction Advisory Committee Secretariat since February, 2001.
HIGHLIGHTS

● The Brahmaputra Board has taken up the construction of the Pagladiya Dam Project which was approved by the Government of India in January, 2001 at an estimated cost Rs. 542.90 crore. The Project located in the Nalbari district of Assam envisages flood moderation in 400,000 hectares, irrigation benefits to 54,160 hectares and a small component of power generation (3.00 MW) as incidental benefit.

● Three Master Plans in respect of Khowai, Ghiladhari and Jinjiram sub-basins were prepared.
ORGANISATION

The Brahmaputra Board, an autonomous Statutory body was set up by an Act of Parliament called The Brahmaputra Board Act. (Act 46 of 1980), under Ministry of Water Resources. The jurisdiction of the Board covers both the Brahmaputra and Barak Valleys and extends over all the seven states of the North-East Region of the country.

The Board consists of 4 fulltime Members comprising the Chairman, the Vice Chairman, the General Manager and the Financial Adviser and 17 part time Members representing 7 States of the North Eastern Region, the North Eastern Council, concerned Ministries namely Water Resources, Finance, Agriculture, Power and Surface Transport and Departments of Government of India, namely Central Water Commission, Central Electricity Authority, India Meteorological Department and Geological survey of India.

In pursuance of the Brahmaputra Board Act, 1980, a High Powered Review Board to oversee the works of the Brahmaputra Board was constituted in 1982 consisting of the Union Minister for Irrigation (now renamed as Water Resources) as Chairman, Chief Ministers of Assam, Manipur, Meghalaya, Nagaland, Tripura, Arunachal Pradesh and Mizoram and the Union Minister of State for Power, Union Minister/Minister of State for Agriculture, Union Minister/Minister of State for Surface Transport, Secretary, Ministry of Water Resources, Government of India, Chairman, Central Water Commission as Members and Chairman, Brahmaputra Board as Member – Secretary. Member (RM), CWC is a permanent invitee to the meetings of the High Powered Review Board.

FUNCTIONS OF THE BOARD

The main functions assigned to the Board are to carry out survey and investigation and to prepare the Master Plan for the control of floods, bank erosion and improvement of drainage congestion, giving due importance to the development and utilization of water resources, of the Brahmaputra and Barak Valleys, for irrigation, hydropower, navigation and other beneficial purposes. Its assignment also includes preparation of Detailed Project Reports of the dams and other projects identified in the Master Plan as approved by the Central Government, and to take up construction of the projects approved by the Central Government and works connected therewith as proposed in the Master Plan, and also to maintain and operate such dams and works.
ACTIVITIES OF BRAHMAPUTRA BOARD ENDING NOVEMBER, 2001

Preparation of Master Plan, Survey and Investigation

The Brahmaputra Board on its formation was entrusted with the work of preparation of the Master Plan of various rivers and tributaries of the Brahmaputra and Barak river system and rivers of Tripura. Due to the enormity of the task the work has been divided into three parts as under:

1. Master Plan (Part-I) : for the Main stem of the Brahmaputra.
2. Master Plan (Part-II) : for the Barak river and its important tributaries.
3. Master Plan (Part-III) : for important tributaries of the Brahmaputra and eight rivers of Tripura.
(A) Master Plan (Part-I)

The Master Plan Part-I (main stem of Brahmaputra) was approved by the Ministry of Water Resources, Government of India during July, 1997.

(B) Master Plan (Part-II)

The Master Plan Part-II (Barak) was approved by Ministry of Water resources, Government of India during July, 1997.

(C) Master Plan (Part-III)

The formulation of the draft Master Plan Part-III comprising 38 tributaries of the river Brahmaputra and 8 rivers of Tripura was started during 1989-90 and completed in March, 1993. These were circulated to all the departments concerned. On the basis of various comments/suggestions received from various State Governments and Central Government Departments, 27 tributary Master Plans have been so far modified and out of them 24 tributaries Master Plans viz. Buridihing, Dekhow, Dhansiri(S), Kopili-Kolong, Puthimari, Ranganadi, Gumti, Pagladiya, Noa Nadi, Dikrong, Muhuri, Jia-Bharali, Manu, Champamati, Disang, Jinary, Na-Nai, Juri Burima, Dhalai, Jiadhal, Bharalu, Lohit and Majuli have been approved by the Brahmaputra Board. These approved Master Plans have been submitted to the Ministry of Water Resources for acceptance. Other three Master Plans of the Khowai, Ghiladhari and Jinjiram sub-basins have been completed and approval from the Board is awaited.

Preparation of DPR of Identified Drainage Development Schemes

34 drainage congestion areas in the Brahmaputra and Barak basins have been identified. Out of them 22 are in the Brahmaputra basin, 8 in the Barak basin and 4 in Tripura. Detailed project reports in respect of the 18 drainage schemes have been submitted to the CWC till November, 2001. The Brahmaputra Board has handed over 4 Drainage Development Schemes to the Flood Control Department, Government of Assam.

Preparation of detailed project report for multipurpose projects

(a) Kulsi Multipurpose Dam Project:

Preparation of Detailed Project Report is in progress and it is proposed to submit the Detailed Project Report by March, 2002.

(b) Lohit Multipurpose Dam Project:

The target date of submission of Detailed Project Report is March’2003.

(c) Noa-Dihing Multipurpose Dam Project:

The target date of submission of the Detailed Project Report has been brought forward and the revised date fixed is March, 2003.

(d) Debang Multipurpose Dam Project:

The tentative target for submission of the Detailed
STATUS OF MASTER PLAN (AS ON 30.11.2001)

TOTAL NUMBER OF MASTER PLAN = 51

APPROVED BY MOWR
1. BRAHMAPUTRA
   MAIN STEM
2. BARAK & ITS TRIBUTARIES

APPROVED BY THE BOARD
1. BURHI-DEHING
2. DIKHOW
3. DHANSIRI (S)
4. KAPILI-KALANG
5. PUTHIMARI
6. RANGANADI
7. GUMTI
8. PAGLADIYA
9. NOA-NADI
10. DIKRONG
11. MUHURI
12. JIA-BHARALI
13. MANU
14. CHAMPAMATI
15. DISANG
16. JINARI
17. JURI
18. NANOI
19. DHALAI
20. BURIMA
21. LOHIT
22. JIADHAL
23. BHARALU
24. MAJULI ISLAND

SUBMITTED TO BOARD FOR APPROVAL
1. KHOWAI
2. GHILADHARI
3. JINJIRAM

UNDER MODIFICATION/ PREPARATION
1. JHANJI
2. HAORA
3. DHALESWARI
4. SUBANSIRI
5. MORIDHA
6. GAURANG

UNDER SURVEY & INVESTIGATION
1. GABHARU
2. DIPOTA
3. BELSIRI
4. SNKOSH
5. GADADHAR
6. TIPKAI
7. BURUI
8. BARGANG
9. BRAHMAJAN
10. BHOGDOI
11. DUDHNOI-KRISHNAI
12. DHANSIRI
13. BEKI-MANAS-AIE
14. BARNAI
15. TANGANI
16. KULSI DEOSILA
STATUS OF DRAINAGE DEVELOPMENT SCHEMES
(AS ON 30.11.2001)

Under Execution
1. HARANG

Awaiting Investment Clearance for execution of Brahmaputra Board
1. JENGRAI
2. EAST OF BARPETA
3. JAKAICHUK
4. JOYSAGAR
5. BORBHAG

MODIFICATION DPR Submitted to CWC for Examination
1. Rudrasagar
2. Singla

DPR Under Investigation
1. Tingrai
2. Sessapather
3. Dharmanagar

Handed over to State Govt.
1. Pola
2. Ghagra
3. Deroj
4. Amjur

TOTAL = 34 Nos
MULTIPURPOSE PROJECTS IDENTIFIED BY THE BRAHMAPUTRA BOARD - STATUS THEREOF

A- DPR Proposed to be Completed during 10th Plan
1. Dibang Dam Project
2. Kynshi-1 Dam Project Stage-I (Jadukata)
3. Noa-Dehing Dam Project
4. Kulsi Dam Project
5. Lohit Dam Project
6. Simsang Dam Project (Someswari)
7. Jiadhal Dam Project
8. Kameng Dam Project
9. Kynshi-II Dam Project

B- DPR Proposed to be Completed during 11th Plan
1. Killing Dam Project
2. Jamuna Dam Project
3. Ashupani Dam Project
4. Kynshi-III Dam Project
5. Tidding Lake Project
6. Upper Lohit Dam Project
7. Tidding Stage-II

C- DPR Completed Projects & Handed over for execution to other organisation
1. Siang (Dihang) Dam Project
2. Subhansiri Dam Project
3. Tipaimukh Dam Project
4. Bairabi Dam Project

D- Projects under Construction
1. Pagladiya Dam Project
Project Report which was fixed as March, 2007 has presently been reviewed and the fresh target has been fixed as December, 2002.

(e) Jadukata Multipurpose Dam Project:

The Detailed Project Report of the project is targeted for submission by the March 2004.

(f) Someswari Multipurpose Dam Project:

The preliminary investigation works are in progress.

North Eastern Hydraulic and Allied Research Institute (NEHARI)

On the basis of clause 7 of the Assam Accord, the Ministry of Irrigation and Power, Government of India (now Ministry of Water Resources) entrusted construction works of NEHARI to the Brahmaputra Board for establishment of a Hydraulics and Allied Research Institute at Guwahati during, September, 1985. The Institute has already procured and installed most of the equipments with adequate infrastructural facilities. An intensive training in soil, Concrete and Rock testing disciplines was provided to the officers and staff of Brahmaputra Board with the help of CSMRS, New Delhi at the Institute Complex.

Execution, Maintenance and Operation of Multipurpose Dams and Other Works

(a) Harang Drainage Development Scheme

The Harang Drainage Development Scheme has been cleared by the Standing Finance Commission of the MOWR at an estimated cost of Rs. 10.81 crores during the 9th Five Year Plan. Accordingly work has been taken up for execution. But due to rise of land value fixed by the district authority and modification of the construction drawings by the CWC, the original estimate has had to be revised and the revised estimated value now comes to Rs. 31.02 crore, which is under process for approval of the competent authority. The up to date progress of construction of the scheme is as follows:

- Construction of sluices: 31%
- Construction of Embankment: 43%

(b) Pagladiya Multipurpose Dam Project (Assam)

The Pagladiya Dam Project has been approved by the Cabinet Committee on Economic Affairs of the Government of India in November, 2000, and the approval of the President of India was communicated in January, 2001, for an estimated cost of Rs. 542.90 crore. The project envisages construction of rolled fill earthen dam 26.20 m high and 23.00 km long at Thalkuchi village, about 26 km north of Nalbari, Head Quarters of Nalbari District in Assam.

The construction period of the project as envisaged in the approved Detailed Project Report is 7 (seven) years. The reservoir of the project is likely to submerge 9 villages fully and 17 villages partially, under the Tamulpur
and the Baska Revenue Circle of Nalbari District. 3271 families of these 26 villages will have to be resettled in the Resettlement and Rehabilitation site in the district, for which the Government of Assam has already identified 2673 ha. of land. The Brahmaputra Board, in accordance with the detailed project report has constituted a Committee on Resettlement and Rehabilitation.

The Board has already initiated actions on the following aspects :-

Socio Economic Bench Mark Survey in the Direct benefit zone (command area, flood plain and R&R site) and benefit spill zone (upper catchment of the project, was completed by the National Productivity Council, and the final report received.

Socio-Economic Bench Mark survey for updating of the Rehabilitation & Resettlement Plan for the Project Affected Families (PAFs) has been taken up by M/S Agriculture Finance Corporation Ltd. in the submergence area of the project. The Relief & Rehabilitation plan has to be updated as the original R&R plan prepared by the Agriculture Finance Corporation Ltd. was completed in the year 1990, and there has been substantial change in the Socio-Economic Scenario in the entire reservoir area and R&R sites identified and earmarked at that time.

Semi-detailed Soil Survey of the Command area of the project has been completed by M/s Water and Power Consultancy Services (India) Ltd.

The Revenue (Settlement ) Department of Government of Assam has started the land acquisition process and the Board has taken over possession of 258 ha of land. Further acquisition of land for this purpose is being continued. The joint survey for Zirat (compensation of property) etc. by the Brahmaputra Board and Government of Assam has been started.

The process for setting up Model Villages for resettlement of the oustees has been initiated.

Geo-technical investigations for foundation of dam and appurtenant structures has been awarded to GSI/ CSMRS.

The process for setting up construction organization has already been initiated by advertising in the News Paper. Applications have been received for recruitment of both technical and non technical posts required for the project. Interviews for recruitment are in process.

Mathematical modeling for conjunctive use of surface & ground water is to be taken up in collaboration with the Central Ground Water Board & Water And Power Consultancy of Services.

The work on preparation of Design and specifications drawings has been taken up by the CWC. Works related to development of infrastructure have also been taken up.
HIGHLIGHTS

- The Construction of Rajghat Dam and its appurtenant works including Civil, Electrical and Mechanical works of Rajghat Power House have been completed.
- Reservoir Operation Manual has been framed and is under the process of approval.
- Instrumentation in the Masonry/Earth Dam has been provided in the Rajghat Dam to monitor the health of the Dam.
- The impounding of water was done up to RL 368.35 M in October, 2001.
- Flow forecasting through telemetry/SCADA system to Rajghat Dam is envisaged.
- All the three units of the Power house have been tested synchronized during the period of July 1999 to 15th December, 1999 and 28.00 million units of Electricity were generated during the testing period.
- Land of 13 villages of Uttar Pradesh is being acquired for the Rajghat Dam. Land of 2 villages and 5% land of 11 villages is still to be acquired.
ORGANISATION AND ITS COMPOSITION

In accordance with the inter-state agreement of July, 1972 between Uttar Pradesh and Madhya Pradesh, a decision was taken to constitute a Control Board for the execution of the Raighat Dam Project, a joint venture of Madhya Pradesh and Uttar Pradesh. Accordingly, the Betwa River Board was constituted under the Betwa River Board Act, 1976 was enacted for efficient, economical and early execution of the Project. The Head Quarters of the Board is at Jhansi (Uttar Pradesh).

The Union Minister of Water Resources is the Chairman of the Board. The Union Minister of Power, Union Minister of State for Water Resources, Chief Ministers and Ministers-in-charge of Finance, Irrigation and Power of the two States are its Members. The activities of the Board are managed by an Executive Committee of the Board headed by the Chairman, Central Water Commission.

RAJGHAT DAM PROJECT

Rajghat Dam Project is an Inter-State Project of the Government of Madhya Pradesh and Uttar Pradesh, being constructed on the River Betwa about 22 km from Lalitput. The project envisages the construction of a 43.80 m. high and 562.50 long masonry dam across the River Betwa flanked by an earthen dam having maximum height of 29.50 m and total length of 10.79 km. On completion, the project will provide irrigation to 1.38 lakh hectare of land in Uttar Pradesh and 1.21 lakh hectare in Madhya Pradesh. The water distribution system in both the States is under execution by the respective States. The installed capacity of the Power House is 45 MW (3 x 15 MW). The costs and benefits of the project are to be shared by these two States equally. The projects existing on the downstream are Matatila Dam Project, Dhukwan and Parichha Weirs. Thus, the Rajghat Dam Project will serve as mother storage for Irrigation in Uttar Pradesh and Madhya Pradesh through a cascade of hydraulic structures in the downstream of the River Betwa.

On completion of the Project, the maintenance of the Dam and regulation of reservoir, shall be carried out by the Betwa River Board, whereas operation and maintenance of Rajghat Hydro Electric Power House shall be done by the Madhya Pradesh Electricity Board (MPEB).

PRESENT STATUS

The estimated cost of the Rajghat Dam at March, 1995 price level is Rs. 267.29 crore and at January, 2000 price level is Rs. 300.60 crore, and that of the Power House at March, 1997 price level is Rs. 131.26 crore.
The construction of the dam and its appurtenant works are almost complete. Land Acquisition of remaining 13 villages in Uttar Pradesh submergence area has to be done by the Betwa River Board. The Work of compensation is in progress. About 83% compensation have been paid so far i.e. 1407.69 lakh have already been paid in 11 villages. The compensation of the remaining 2 villages namely, Benderguda and Nunawali is to be done and will be started shortly. All efforts are being made to complete compensation work of all the villages by May, 2002, well before onset of the Monsoon 2002. Landscaping and beautification on either side of the masonry dam are yet to be done. Civil, Electrical and Mechanical works of the Rajghat Power House have also been completed. All the three units of the Power House have been tested synchronized during the period of July, 1999 to 15th December, 1999, and 28.00 million units of Electricity were generated during testing period. In the year 2001-2002 a total of 76.48 million units of Electricity could be produced.

BUDGET

The Executive Committee has approved budget estimate of Rs. 28.08 crore for Rajghat Dam Project and Rs. 1.21 crore for Civil Works of Rajghat Hydro Electric Project for the year 2001-2002.

MEETINGS

During 2001-2002 one meeting of the Executive Committee of Betwa River Board was held on 21.08.2001(73rd) and one more meeting is expected before March, 2002.
HIGHLIGHTS

- Bansagar Dam was raised to its crest level in June, 2000 and with the partial storage created, power generation and some irrigation in Madhya Pradesh has commenced. With Bansagar waters, about 900 million units electricity worth about Rs 180.00 crore have been generated during the year 2000-2001 and 2001-2002 till December, 2001. Bansagar Project when completed will generate 425 MW of hydropower besides irrigation in an area of about 5.00 lakh hectare in the three States of Madhya Pradesh, Uttar Pradesh and Bihar in addition to providing domestic and industrial water supply to a number of Villages and Cities. It is estimated that the project will pay back its cost in about 8 years, from power generation alone.
ORGANIZATION & COMPOSITION

The Bansagar Control Board was set up by the Government of India through a Resolution in January 1976. The Resolution was amended in 1990. The Resolution was in accordance with an agreement reached between the Governments of Madhya Pradesh, Uttar Pradesh and Bihar on 16th September, 1973 for sharing the waters of River Sone and the cost of the Bansagar Dam. After amendment the main features of the resolution are as below:

"In consultation with the Governments of Madhya Pradesh, Bihar and Uttar Pradesh, it has been decided to set up the Bansagar Control Board with a view to ensuring the efficient, economical and early execution of Bansagar dam including all connected works in Madhya Pradesh, but excluding the canal systems which will be executed by respective States namely, Madhya Pradesh, Uttar Pradesh and Bihar. The Control Board will be in overall charge of the project including its technical and financial aspects. The actual work of construction will be carried out under the direction of the Control Board by the Chief Engineer concerned of the Madhya Pradesh Government."

"The Three State Governments agree to delegate powers to the Chief Engineer, Madhya Pradesh, to contract for works, supplies and services under the direction of the Control Board. The contract in respect of all works will, however, be executed in the name of the Governor of Madhya Pradesh."

The Union Minister of Water Resources is the Chairman of the Board and the Minister of State for Water Resources, Union Minister of Power, Chief Ministers, Minister-in-Charge of Irrigation and Finance of the three States and Minister-in-Charge of Electricity of Madhya Pradesh are its members. The Executive Committee set up under the Chairmanship of the Chairman, Central Water Commission, manages the day-to-day affairs of the Board. The expenditure on the office of the Board is initially met out of the budget grants of the Union Ministry of Water Resources and subsequently reimbursed by the three States of Madhya Pradesh, Uttar Pradesh and Bihar.

BANSAGAR DAM PROJECT

Bansagar Dam, on Sone River, a joint venture of the States of Madhya Pradesh, Uttar Pradesh and Bihar is being executed by the Water Resources Department, Government of Madhya Pradesh under the directions of the Bansagar Control Board. The respective States are carrying out the execution of the canals and power systems independently.

The benefits and cost of the dam, including land acquisition and rehabilitation, are shared...
by Madhya Pradesh, Uttar Pradesh and Bihar in the ratio of 2:1:1. The project was originally estimated to cost Rs 91.30 crore. The revised cost of the project at 1991 price level is Rs 936.00 crore (Civil Works Rs 300.00 crore and LA&R Rs 636.00 crore). Project authorities have updated the cost estimate based on Madhya Pradesh Unified Civil Schedule of Rates (UCSR) -1998 to Rs. 1054.96 crore (Civil works Rs 391.30 crore and Land Acquisition & Rehabilitation (LA&R) Rs 663.66 crores) which is yet to be approved by the Executive Committee of BCB.

**Components of Bansagar Dam**

The Bansagar dam envisages construction of—

i) 67.5 m high masonry dam including rockfill flanks across the Sone river just downstream of the gorge at Kusumah (Deolond). The length of the masonry dam, left rockfill dam and right rockfill dam are 670.00 m, 161.00 m and 185.00 m respectively.

ii) Six low earth dykes, four on the left bank of Sone river and two on its right bank with a total length of 6.95 km.

iii) Kuteshwar Lime Stone Deposits Protection works.

**Benefits from the Project**

**Irrigation Benefits**-

(i) Annual Irrigation in M.P. (in the districts of Rewa, Sidhi, Satna and Shahdol).

(ii) Annual Irrigation in U.P. (in the districts of Mirzapur and Allahabad)

(iii) Annual Irrigation in Bihar towards stabilizing irrigation through old Sone Canal system.

**Power Benefits**-

(i) Power generation in Madhya Pradesh 425 MW

**Completion Schedule**

As per the construction programme approved by the Executive Committee in its 62nd meeting held on 31.08.2001, it is proposed to complete the dam as per the following schedule, provided funds as per the construction programme are provided by the participating States of Madhya Pradesh, Bihar and Uttar Pradesh.

- Dam up to Crest level : Since completed in June, 2000.
- Dam up to Top Bund Level (full height) : By June, 2003

**Progress of Works**

The rockfill dams and non-overflow masonry dams on either flank have been completed.
2001-2002

Bansagar Dam - Completed up to Crest level

Bansagar Dam - toe Powerhouse (3 X 20 MW)
to their full heights. All the overflow blocks have been completed up to crest level of 326.40 m and Rehabilitation & Resettlement (R&R) works of 44,000 (Project Affected Persons) PAP’s up to the corresponding submergence level of RL 335.00 m have also been completed. With the partial storage up to crest level of the dam, power generation has commenced and about 400 million units of electricity, besides irrigation in area of about 1000 hectare and domestic water supply to Rewa and adjoining towns/villages have been provided in the year 2000-2001. During the current year 2001-2002, in addition to the existing 3 units of 105 MW at Powerhouse-1, two units of 20 MW each were commissioned at the dam toe Powerhouse during July, 2001 and September, 2001 respectively. With the power generation alone, the project is likely to pay back its cost in next 10 years.

The dam at its full height will submerge 336 villages. According to the Socio-Economic survey conducted in 1980-81 approximately 1.50 lakh PAPs of 23,390 families are likely to be affected. Total 56,428-hectare land is coming under submergence, out of which 34,765-hectare is private land, 17,185-hectare is revenue land and 4,478-hectare is forestland. R&R Programme is being implemented based on norms approved by Executive Committee and orders issued by Government of Madhya Pradesh. Comprehensive R&R Policy for the project has been finalized.

Budget & State Shares

The Budget provision made for the project; sub-head wise expenditure during the financial year 2000-01 and cumulative expenditure up to March, 2001 is as under :

(Rupees in Crores)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Sub-head</th>
<th>Budget Provision</th>
<th>Expenditure during 2000-01</th>
<th>Cumulative expenditure up to 3/2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Establishment</td>
<td>12.86</td>
<td>11.05</td>
<td>85.71</td>
</tr>
<tr>
<td>2</td>
<td>Tools &amp; Plants</td>
<td>0.025</td>
<td>0.01</td>
<td>1.81</td>
</tr>
<tr>
<td>3</td>
<td>Suspense (debit)</td>
<td>1.30</td>
<td>2.30</td>
<td>146.50</td>
</tr>
<tr>
<td>4</td>
<td>Works</td>
<td>21.395</td>
<td>29.95</td>
<td>580.20</td>
</tr>
<tr>
<td></td>
<td><strong>Gross Total</strong></td>
<td><strong>35.58</strong></td>
<td><strong>43.31</strong></td>
<td><strong>814.28</strong></td>
</tr>
<tr>
<td>5</td>
<td>Suspense (Credit)</td>
<td>1.30</td>
<td>3.60</td>
<td>136.19</td>
</tr>
<tr>
<td></td>
<td><strong>Net total</strong></td>
<td><strong>34.28</strong></td>
<td><strong>39.71</strong></td>
<td><strong>678.09</strong></td>
</tr>
</tbody>
</table>
The State Governments of Madhya Pradesh, Uttar Pradesh and Bihar fund the project in the ratio of 2:1:1. The details of share due/received in relation to the expenditure incurred as on 31.03.2001 is as under:

(Rs in crores)

<table>
<thead>
<tr>
<th>Total Expenditure</th>
<th>Share Due/Share Received</th>
<th>Balance Share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M.P.</td>
<td>U.P.</td>
</tr>
<tr>
<td>Up to March, 2000:</td>
<td>638.37</td>
<td>319.19</td>
</tr>
<tr>
<td>638.37</td>
<td>250.52</td>
<td>188.78</td>
</tr>
<tr>
<td>During 2000-01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.71</td>
<td>6.75</td>
<td>32.96</td>
</tr>
<tr>
<td>Total as on</td>
<td>339.04</td>
<td>169.52</td>
</tr>
<tr>
<td>31.03.2001:</td>
<td>257.28</td>
<td>221.74</td>
</tr>
</tbody>
</table>
HIGHLIGHTS

- The inflow realized in the Tungabhadra Reservoir till October, 2001 was 4,990.00 M Cum (176.22 TMC ft).
- The utilization of water excluding evaporation losses till October, 2001 was 1898.00 M Cum (67.03 TMC ft).
- The utilization of water by Karnataka and Andhra Pradesh till October, 2001 was 1,247.06 M Cum (44.06 TMC ft) and 650.40 M Cum (22.97 TMC ft) respectively.
- Evaporation losses from June to October, 2001 were 136.80 M Cum (4.83 TMC ft).
- Power generated till October, 2001 was 82 million units against the target of 200 million units for the year and this was shared between Andhra Pradesh and Karnataka in the ratio of 80:20.
- The process of selecting an Independent Power Producer for setting up a mini hydel plant of 8.25 MW under BOOT system at head of the Right Bank High Level Canal was finalized.
- The fishing rights of the Tungabhadra Reservoir for the year were auctioned for Rs.31.51 lakh.
- The Ice-cum-Cold Storage Plant generated revenue of Rs.6.28 lakh till October, 2001 against target of 8.28 lakh for the year.
- The Fishnet Making Plant generated revenue of Rs.31.32 lakh till October, 2001 against target of Rs. 40.00 lakh for the year.
- The Board held two meetings till October, 2001.
ORGANISATION AND ITS COMPOSITION

The Tungabhadra Board was constituted by the President of India in exercise of the powers vested under sub section (4), Section 66 of the Andhra State Act for completion of the Tungabhadra Project and for its operation and maintenance.

The Board is in charge of common portion of the Tungabhadra Project. The Krishna Water Disputes Tribunal has made a specific provision in its Award for the use of water available for utilization in the Tungabhadra Dam by the States of Karnataka and Andhra Pradesh. The responsibility for carrying out these specific provisions relating to the use of water available for utilization in a water year in the Tungabhadra Dam has been entrusted to the Tungabhadra Board by the Tribunal. The Board is regulating water for irrigation, Hydro Power generation and other uses from the reservoir.

At present, the Board consists of the Chairman, appointed by the Government of India, a Member representing Government of India,....
and two Members, one each, representing the States of Andhra Pradesh and Karnataka, all working part-time in the Tungabhadra Board. In the discharge of its assigned functions, the Board exercises powers of a State Government. It makes rules for the conduct of its own business. The Government of Andhra Pradesh and the Government of Karnataka provide funds in an agreed proportion, and also depute staff to man the various specified posts, as per an agreed proportion.

The working table for canal wise distribution of water to the States is prepared every year by the Tungabhadra Board in consultation with the State Governments, and is reviewed from time to time during the water year. The regulation of water is carried out in accordance with the working table.

**STATUS OF ACTIVITIES**

**Irrigation**

As the monsoon rains were deficit in the catchment, the Tungabhadra Reservoir did not fill up to the full reservoir level in the year. The inflow into the reservoir from June to October, 2001 was 4,990.00 Million Cumec (Mcum) [176.22 Thousand Million Cubic feet (TMC ft.)].

![Right Half of Tungabhadra Dam and Reservoir](image)
The utilization of water by the states of Karnataka and Andhra Pradesh till October, 2001 was 1,247.60 MCum (44.06 TMCft) and 650.40 MCum (22.97 TMCft) respectively as against the likely utilization of 4,077.60 MCum (144 TMCft) for the water year 2001-2002. Evaporation losses from June to October, 2001 were 136.80 MCum (4.83 TMCft) to be shared by Karnataka and Andhra Pradesh in the ratio of 12.5 : 5.5.

**Hydro Power**

Two Power Houses are maintained by the Tungabhadra Board, with a total installed capacity of 72 MW, and a target of 200 million units of power generation is envisaged during the water year 2001-2002. Against this the power generated till October, 2001 was 82.14 million units. The target for 2002-2003 is 200 million units. The power generated is shared between the States of Karnataka and Andhra Pradesh in the ratio of 20:80.

**Mini Hydel Power Plant**

There is a proposal for establishing a Mini-Hydel Plant, to be located at the Right Bank High Level Canal of the Tungabhadra Project on Build, Operate, Own and Transfer (BOOT) basis. The capacity of the plant is 8.25 MW with an yearly generation of 27 million units. The process of identifying an Independent

*Right Bank High Level Canal with Hillock and Vertical Wall on either side*
Power Producer (IPP) for setting up the mini hydel plant was completed and the Andhra Pradesh Power Transmission Corporation (APTRANSCO) was requested to enter into a power purchase agreement with the IPP.

Further, the Government of Karnataka has accorded approval for setting up a mini-hydel power plant of 1.20 MW capacity to M/s Tungabhadra Steel Products Limited at head of the Raya and Basavanna channel of the Tungabhadra Dam. The Tungabhadra Board is examining the proposal of M/s Tungabhadra Steel Products Limited for granting permission.

**Fisheries**

The Tungabhadra Reservoir has a water spread area of 378 Sqkm at full reservoir level affording tremendous scope for development of fisheries. Quality fish seeds are reared in the Board’s Fish Farm to meet the demand of the public and for stocking in the Reservoir to increase the biomass. The fishing rights of the Reservoir was auctioned for the year to a local Fisheries Society for Rs. 31.51 lakh. In order to facilitate preservation of fish catch, the Board is running an Ice-cum-Cold Storage Plant which generated a revenue of Rs.6.28 lakh till October, 2001 against the target of Rs.8.28 lakh for the year. The Board has also established a Fish Net Making Plant to manufacture and supply quality fish nets. The revenue generated on account of selling fish nets till October, 2001 was Rs.31.32 lakh against target of Rs. 40.0 lakh for the year.

**Board Meeting**

The Tungabhadra Board held two meetings till October, 2001.
HIGHLIGHTS

- WAPCOS is now recognized amongst the top ranking consultancy organizations of the World in Water, Power and Allied Sectors.

- The Company is accredited with ISO 9001 94 certification from EAQA, United Kingdom, and also enjoys the status of “Mini Ratna” conferred by Government of India by virtue of WAPCOS’ consistent track record of “Excellent” performance and profit earning.

- The consultancy income of the company has reached an all-time high of Rs. 4241.29 Lakhs in 2000-2001 of which the net foreign exchange earnings is equivalent to Rs. 333.52 Lakhs.

- The company has paid a dividend of Rs. 0.95 crore, which is 47.5% of the paid up capital.

- WAPCOS has been venturing into newer fields such as Software Development, Financial Management System, Quality Control, Roads & Bridges, Technical Education, Infrastructure Development apart from taking up turnkey assignments in Small Hydro & Construction Supervision.
Water and Power Consultancy Services (India) Limited (WAPCOS) - a Public Sector Enterprise under the aegis of the Union Ministry of Water Resources, was set up by the Government of India in the year 1969 to channelise Indian expertise in Water & Power Sectors and allied fields for the benefit of developing countries, and is now recognised amongst the top ranking consultancy organisations of the World in these sectors. The company is accredited with ISO 9001:94 certification from EAQA, UK, and also enjoys the status of “Mini Ratna” conferred by Government of India by virtue of WAPCOS’ consistent track record of “Excellent” performance and profit earning. WAPCOS has also received the Prime Minister’s award, initiated by the Govt. of India, for excellence in achievement of MOU targets for the year 1998-99.

WAPCOS’ spectrum covers a wide range of activities e.g. pre-feasibility studies, feasibility studies, field investigations, detailed engineering including designs, detailed specifications, tendering process, contract and construction management, commissioning and testing, operation and maintenance, quality assurance & management, and human resources development.

Main fields of the company cover Irrigation and Drainage; Flood Control and Reclamation; River Management, Dam, Reservoir Engineering and Barrages; Integrated Agriculture Development; Watershed Management; Hydropower and Thermal Power Generation; Transmission and Distribution; Ground Water Exploration, Development and Minor Irrigation; Water Supply and Sanitation (Rural and Urban); Environmental Engineering including Environmental Impact Assessment and Environmental Audit; Ports and Harbours and Inland Waterways; Rain Water Harvesting; Surveys & Investigations; Human Resource Management; System studies and Information Technology. WAPCOS has also been venturing into newer fields such as Software Development, Financial Management System, Quality Control, Roads & Bridges, Technical Education, Infrastructure Development apart from taking up turnkey assignments in Small Hydro & Construction Supervision.

In recognition of its contributions in the Water and Power Sectors, WAPCOS has been elected as a member of the Governing Body of Consultancy Development Centre, an autonomous body supported by Department of Scientific & Industrial Research (DSIR), Ministry of Science & Technology and as Vice President of the Governing Council of Consulting Engineers Association of India (CEAI) for the year 2001-2003. WAPCOS had also been associated in the preparation of the 10th Five Year Plan of Government of India and acted as Member of various
Committees Constituted by the Planning Commission. WAPCOS has made a niche within the Ministry of Water Resources & Ministry of Rural Development, Government of India and deliberates on technical matters, national policy issues, way forward approach to irrigation & drainage and privatisation issues on the subject.

During the year 2001-2002 the Company hopes to achieve all the targets set out in Memorandum of Understanding (MOU) for the year 2001-2002 and may once again get “Excellent” grading under the MOU scheme. The Company will be able to manage its business operations from within its own internal resources generation in the year 2002-2003 as well.

FINANCIAL ACHIEVEMENTS

The year 2000-2001 has been momentous one both from the point of view of performance as well as in respect of significant policy orientation for the company’s growth. The company has been able not only to sustain the growth of business but also significantly improve upon the same. In spite of stiff competition in the Consultancy business, both in international and domestic markets, the consultancy income of the Company has reached an all-time high of Rs.4241.29 lakhs in 2000-2001 as against Rs.3657.76 lakhs in 1999-2000. In the foreign exchange earnings front also, inspite of constraints and difficulties in the foreign market being faced currently as a global phenomenon, the company has been able to post net foreign exchange earnings equivalent to Rs.333.52 lakhs. In view of the excellent performance of the Company for the year 2000-2001, the company paid a dividend of Rs.0.95 crore, which is 47.5% of the paid-up capital of Rs.200.00 lakhs as against 30% paid in 1999-2000. The company since its inception has been able to manage its business operations from its own resources and has not taken recourse to borrowing.

TECHNICAL ACTIVITIES

WAPCOS as a premier Consultancy Organisation in the Water Resources and Power Sectors has three major Centres, the performance of which during the Financial Year 2000-2001 is reported below:

CENTRE FOR WATER RESOURCES

The Water Resources Centre undertakes consultancy services in the major fields of Irrigation, Drainage, Watershed Management, Surface and sub-Surface Drainage, Survey & Investigation and Training. These major fields Irrigation and Drainage are dealt along with other allied fields of Flood Mitigation, Hydrological Studies, River Morphological Studies, Diagnostic Studies, Water Management, Command Area Development Works, Agricultural Based Studies, Watershed Management, Ground Water Exploration and Development, Master Plan Studies for Overall Development, Sociological Studies and Human Resources Development. These fields are covered through the following specialised Divisions:
INFRASTRUCTURE DIVISION

This division caters to the variety of projects other than in the conventional. Major projects undertaken by this division are as below:

FOREIGN PROJECT

- Suluh Valley Development Study, Ethiopia

WAPCOS secured a project for providing consultancy services for the preparation of Suluh Valley Integrated, Rural, Agriculture and Water Resources Development Plan for the northern part of the country for a duration of 14 months.

INDIAN PROJECTS

During the year under review, the major projects secured include Uttar Pradesh Sodic Lands Reclamation-II Project, UP; NTMC, Teesta Barrage Project, West Bengal; Regional Ground Water Flow Simulation Model for Varahanadi River Basin, Tamil Nadu and Performance Evaluation Study for Kangsabati Reservoir Project, West Bengal and the works are in progress. Final reports were submitted pertaining to widening of Agra-Dholpur Section of NH-3 from Km 24 to Km 41, Uttar Pradesh and Tamenglong-Tousem-Haflong Road Project, Meghalaya.

SURVEYS & INVESTIGATIONS DIVISION

This division caters to the basic need of field work for surveys and investigations for all types of engineering works including roads and highway sector. During the year under review, the major projects secured include the Srisailam Right Bank Canal Project, Andhra Pradesh; Ghataprabha Right Bank Canal Project, Karnataka and Sukli Silwara Irrigation Project, Rajasthan, and the works are in progress. Consultancy services continued to be provided with respect to the Socio-Economic Study of Gosikhurd Project, Bhandara, Maharashtra; Command Area Survey and Micro Canalisation of IGNP Stage-II, Rajasthan; Design, Survey & Geotechnical Investigation for Gararda Irrigation Project, Kota, Rajasthan and Integrated Planning of Roads, habitation etc. while preparing CAD, Indira Gandhi Nahar Pariyojana (IGNP) Chak plans, Rajasthan.

SURFACE & SUB-SURFACE DRAINAGE DIVISION

This division caters to sub-surface drainage studies, flood studies for safe passage of floods, both structural and non-structural measures, command area development works, development of small tanks and integration with main irrigation works.

The major projects secured during the financial year under review include Minimum Rehabilitation of Minor Irrigation Tanks under AP-III, Irrigation and CAD Department, Andhra Pradesh; Monitoring of Implementation of Waterlogging Reclamation Schemes in CAD Canal Commands, Kerala; Real Time Flood Forecasting in Tambraparani Basin of Tamilnadu, Tamil Nadu; Preparation of Master Plan for Flood Management and Erosion
Control, West Bengal; Study on Impact of Irrigation System Performance in Closing the Gap in Utilisation in CAD Canal Commands, MOWR; Assessment of Region-wise Technological Advancement in Irrigation Management, MOWR and Implementation of River Lift Irrigation Schemes, West Bengal. Consultancy services continued to be provided pertaining to Study of Waterlogging in Seven Canal Command areas under CAD Programme, Ministry of Water Resources.

INFORMATION TECHNOLOGY & WATERSHED MANAGEMENT DIVISION

This division caters to Information Technology and Watershed Management, dry land farming through water harvesting structures, ground water recharge, ground water development, lakes development on turnkey basis as well as detailed studies for watershed management.

During the year under review, major projects secured include the Construction of Water Harvesting Structures in Assam, Dadra and Nagar Haveli, Delhi and Meghalaya. The projects also involve services for roof-top rain harvesting structures, recharge schemes and development of lakes and springs.

WATER RESOURCES DIVISION

This division deals in major irrigation and drainage projects for preparation of feasibility studies including field investigations, sociological and agricultural studies.

Consultancy services continued to be provided in respect of Kurnool-Cuddapah Modernisation Project, Andhra Pradesh; Deopani & Amreng Medium Irrigation Project, Assam; Haryana Operational Pilot Project, Haryana; The Ambaran Lift Irrigation Scheme, Jammu and Kashmir; Pynthornein Medium Irrigation Project, Meghalaya; Flood Protection and Drainage of Kharukol Area South Garo Hills, Meghalaya; Rengali Irrigation Sub-project LBC of Phase-I, Orissa; Micro Canalisation of Tonk Branch and Nagar Distribution Systems of Bisalpur Project, Rajasthan. The projects secured during the year include Mawrammah Valley Medium Irrigation Project, Meghalaya; Environmental Studies and Catchment Area Treatment for Myntdu Leshka Hydroelectric Project, Meghalaya and Integrated Management of Water Resources, Uttar Pradesh.

TRAINING DIVISION

This division has been providing training to officials of State and Central Governments. In the year 2000-2001, 34 national level training programmes sponsored by Ministry of Water Resources were organised in various states related with Command Area Development.

COMMERCIAL AND INFORMATICS CENTRE

Under the allied activities of corporate functions, this Centre keeps track of market intelligence, coordinates submission of expressions of interest and updates registration with multilateral funding agencies as well as other executive agencies. It represents the
Company in deliberations at Joint Commissions/Mission meetings, technical and trade associations as well as Joint Business Councils for exploring job opportunities and membership of various agencies. It is also entrusted with the task of publication of brochures, publicity through advertisements, participation in exhibitions etc. It also monitors Memoranda of Understanding with associates/agents in foreign countries besides Memoranda of Understanding for joint ventures with consultancy organisations from other countries. The work of preparation of periodical reports and returns such as monthly technical bulletins, quarterly status reports of on-going projects and bids under evaluation is also looked after by this centre.

It has also been entrusted with the responsibility of monitoring the MOU targets as laid-down by the task force, as well as liaising for human resources development programmes, liaising for ISO certification and linking with the Website and networking with other organisations like Federation of Indian Chambers of Commerce & Industry (FICCI), Confederation of Indian Industries (CII), Consulting Engineers Association of India (CEAI), International Commission on Irrigation & Drainage (ICID), Indian National Committee on Irrigation & Drainage (INCID), Indian Water Resources Society (IWRS), Indian Society for Rock Mechanics & Tunnelling Technology (ISRM/IT), National Informatic Centre (NIC), Consultancy Development Centre (CDC) and Indian Water Partnership (IWP).

This centre also takes under its fold Information Technology activities. It takes up specialised assignments in System Studies, mathematical modelling for multi-purpose reservoirs, hydrological modelling, basin planning, development of MIS for technical, administrative and financial packages for the respective users. This centre has a well-trained man-power base well supported by PCs ranging from the early models to the latest versions. Software support is provided by the in-house expertise and through joint ventures with outside parties.

During the year under review, the projects secured by this division include Technical Assistance for Economic Reforms Project; Pilot Project on Rain Water Harvesting; Underground Sewerage System of Daman; Preparation of Master Plan of the Water Supply for Nani Daman; Preparation of Master Plan of Water Supply Scheme for Dadra & Nagar Haveli and Development of lake in Silvassa. The Centre continued to provide consultancy services with regard to Preparation of Project Document for Setting up of Arsenic Mitigation Centre in Calcutta; Modernisation of Sukla Irrigation Project; Sewerage Scheme for Silvassa Town; Underground Drainage and Cabling System for Silvassa and Amli; Design of Rural Water Supply Scheme for various villages in Mandoni Patelad; Financial Management System for the 8th India Population Project (IPP-VIII); Development of MIS Software for Municipal Corporation of Delhi; Design of Protection Wall against Sea-erosion at Daman and Design of Extension of Existing Jetty at Nani Daman. Apart from dealing in various projects the division also undertook other activities like:
Published an in house journal-WAPTECH, a Special issue on “Transmission & Distribution of Power”.

10 District Level Workshops on “Promoting Community Participation in Rural Water Supply Programme” for Rajiv Gandhi National Drinking Water Mission were organised at various District centres in the country.

Organised a training programme for Tala Hydro-Electric Project Authority (THPA) staff of Bhutan for use of various computer packages etc.


Organised a ‘Round Table Conference’ on Bio-Drainage as a follow-up activity of 8th International Commission on Irrigation & Drainage (ICID) International Drainage Workshop.

**COMMERCIAL ACTIVITIES**

Dynamic indicators e.g. Customer Satisfaction, Time Overrun, Turnover & New Business are monitored for achievements of targets as per MOU.

Organising and participating in Exhibitions, Training Programmes, workshops etc.

Internet and various business bulletins were used for commercial activities. Internet is fully utilised in downloading of business opportunities and for online registration with funding agencies/Banks like World Bank, Asian Development Bank, African Development Bank and UN Agencies etc.

Corporate & sectoral Brochures were published.

Commercial Database was created for information on Bids/Pre-Qualification Document (PQD) submitted, awarded & lost with analysis and reasons. Information in respect of clients, competitors, awards, embassies, country profiles and MOU with other agencies etc. is kept.

The Monthly Technical Bulletins and Quarterly Status Report were prepared to monitor progress/status of ongoing projects & bids under evaluation.

Membership and their renewals dealing with organisations like Federation of Indian Chambers of Commerce & Industry (FICCI), Standing Conference of Public Enterprises (SCOPE), Consultancy Development Centre (CDC), Consulting Engineers Association of India (CEAI), Federation of Indian Export Organisation (FIEO) and Engineering Export Promotion Council (EEPC) etc.
CENTRE FOR INFRASTRUCTURE PROJECTS

The Centre for Infrastructure Projects covers the fields of Power, Environment, Ports & Harbours and Water Supply & Sanitation.

CENTRE FOR ENVIRONMENT

The Centre for Environment has been conducting environmental studies for various mega projects in hydropower, water resources, ports & harbours, mining, industrial sector etc. The Centre for Environment’s major activities involved environmental impact assessment (EIA) studies for diverse projects, contaminated site assessments, forestry, design of treatment plants, air and water quality models, terrestrial and aquatic ecological studies.

During the period, the Centre has conducted about 25 EIA studies, formulation of Rehabilitation & Resettlement Plans (R&R), social surveys, Catchment Area Treatment & Management Plans and Development of Coastal Information System using Remote Sensing and Geographical Information System tools. The Centre has also diversified its range of activities for Risk Assessment, Site liability assessment, preparation of onsite & offsite Disaster Management Plan and Dam Break Analysis and hazard scenarios identified through Remote Sensing & GIS packages. Our clients include reputed organisations like Oil & Natural Gas Corporation (ONGC), National Thermal Power Corporation (NTPC), National Hydro-Electric Power Corporation Ltd. (NHPC), National Telecom Company Limited (NATELCO), Kerala State Electricity Board (KSEB), Brahmaputra Board and the Gujarat Maritime Board. The Centre has conducted several public hearings on behalf of clients and obtained environmental clearance as per the Environment Act for several projects.

PORTS & HARBOURS DIVISION

This division is involved in carrying out Techno-economic feasibility studies, Preparation of detailed project reports, Detailed Engineering, Project Implementation & Monitoring including Field Investigations, Model Studies for Marine structures viz. Breakwater, Jetties, Slipways, Wet & Dry docks, Quays, Fishing Harbours, Navigation, Locks, Naval & Infrastructural facilities.

During the year, the new projects secured include Consultancy Services for Contract Management of River Conservancy Works on National Waterways (NW) - 1 and NW-2 for M/s Inland Waterways Authority of India (IWAI); Feasibility study and Petrogas Field Measurement for development of port at Okha for M/s WIMCO Petrogas Ltd., Gujarat; Consultancy services for setting up marine base at Jaigarh, Great Eastern Shipping Company Limited (GESCO), Maharashtra and Techno-economic Feasibility study for development of navigation in river Varuna. Draft reports were submitted pertaining to Techno-economic feasibility study for development of multi-purpose port at Rewas – Aware for M/s Amma Lines Pvt. Ltd. and Development of Inland Water Transport. Further, services continued to be provided in
respect of Detailed Project Report for Development of Fresh Water Lake at Flat Bay-Port Blair for Andaman and Lakshadweep Harbour Works; Setubandh Joining Beyt Dwarka and Kyu Island, Gujarat Maritime Board; DPR for Development of Multi-Purpose Port at Maroli, National Telecom Company Limited (NATELCO) and Development of Fisheries Harbour at Sakhri Nate and Harnai for Government of Maharashtra.

WATER SUPPLY AND SANITATION DIVISION

The main fields of operation of Water Supply and Sanitation Division are planning/designing of rural and urban water supply schemes/sewage treatment and disposal schemes, besides leak detection and reduction, laboratory testing, inspection and quality control of supply material.

FOREIGN PROJECTS

Water Supply and Sewerage for Residential Colony Sienchekha and Arekha (Tala Hydroelectric Project), Bhutan

Preparation of tender documents for gravity mains for the water supply schemes for residential colonies at Sienchekha and Arekha along with the hydraulic designs of proposed Water Treatment Plant have been completed.

Laboos Area Water Supply Project-Contract III-: (Republic of Yemen)

Contract III of the project pertains to overall contract management for the construction works of water supply distribution systems. Construction works for all the components stand completed. The Project Team stationed at the Project Site is presently carrying out testing and commissioning of the installed water supply systems.

INDIAN PROJECTS

During the period under review, the major projects secured include Preparation of Master Plan for Greater Jammu for water supply distribution and augmentation systems; Integrated Sewerage and Storm Water Drainage Schemes of Cuttack City; Master Plan for Water Supply, Sewerage & Drainage for Noida. Final reports were submitted pertaining to Evaluation Study of the projects of Water Supply Schemes of J&K Master Plan, Phase I works; Water Supply Schemes at Shastri Park at Metro Corridor, Delhi Metro Rail Corporation; Interception, Diversion of Sewage and Sewerage Treatment Plant under Godavari Action Plan; Technical Feasibility Study of Sewerage Treatment Plant (STP) at Greater Noida, Preparation of DPR for Interception & Diversion of Sewage Plant & Sewerage Treatment Plant (IDS&STP) for Cuttack and Talcher; Multistage Pumping Schemes of South Sikkim, Formulation of Water Supply Proposal around Ahmedabad City.

CENTRE FOR POWER

The centre consists of two civil engineering divisions i.e. Hydro and civil design and one electrical division. These divisions render
consultancy services pertaining to all disciplines of power sector and other civil structures related to water resources development. The power discipline includes hydro power stations, thermal generation, transmission & distribution and rural electrification and non-conventional energy sources.

The areas of consultancy of the centre range from surveys and investigations, planning, feasibility studies and preliminary/detailed designs, construction management and supervision. During the year, assignments in new areas were secured relating to design consultancy for Shrinagar Hydro Electric Project-EPC with Hindustan Construction Company (HCC), Larsen & Toubro (L&T) and Operation & Maintenance (O&M) norms for H.E. projects for Central Electricity Regulatory Commission.

FOREIGN PROJECTS

PROJECTS IN BHUTAN

● Tala H.E. Project

Tala H.E. Project envisages the generation of 4865.00 million units of energy in an average year and to provide 1020 MW of peaking power. The Project envisages the utilisation of 860 metre fall in about 30 km length of the river Wangchu from downstream of Chukha Power House. WAPCOS is continuing to provide consultancy services in association with Central Electricity Authority (CEA), Central Water Commission (CWC), Central Soil & Materials Research Station (CSMRS), Survey of India (SOI), Central Water & Power Research Station (CWPRS) covering the services of field investigations, model studies, detailed design/engineering for civil, hydromechanical and electro-mechanical works, preparation of tender documents, assistance in evaluation of tenders and implementation stage inter-action. The major inputs included control/precision surveys for construction, hydro-meteorological & seismological observations & analysis and 9 hydraulic model studies. The revised cost estimate of the Project is Rs/ Nu (Bhutanese currency) 2918.45 million (September 1999 price level) and is under finalisation in the Central Electricity Authority, Government of India. Extra time taken in construction of access roads, extremely difficult geological strata encountered in tunnelling at some locations and unprecedented rains of Monsoon 2000 are being tackled in the Project implementation. Acceleration measures for compressing the shortfalls in the construction schedule have been taken up. At present, 9.5 km of the Head Race Tunnel (HRT) out of 22.97 km have been excavated from 11 faces. Excavation for Dam foundation and for Intakes has been completed. 373.00 m of pilot shaft has been completed out of the 2 Pressure shafts 1.10 km long each. Excavation of Main Access Tunnel and Construction Adit to Power House have been completed. Contracts for Generating Equipment, Built Operate Transfer (BOT) Cranes, Gates & Hoists and Transmission Lines within Bhutan have been awarded and are under implementation. WAPCOS has convened and co-ordinated meetings of Technical Co-ordination Committee (TCC) to deliberate on important
technical issues. Assistance was extended for preparation of Project Manuals, PERT Chart, Annual Budget, Specialised Studies, Authority meetings and other special committees.

In-house consultancy is being provided to Tala Hydro-Electric Project Authority (THPA) for construction power & electrification of seven colonies. For the electrification of colonies, equipment specifications have been issued and tendering is in progress. For the first time Ring Main Units are being introduced for reliable distribution of power in Bhutan.

● Kurichu H.E. Project

WAPCOS has been retained as consultant for review of basic designs, drawings, specifications and assisting Kurichu Project Authority in construction supervision, progress monitoring and release of payments to National Hydro-Electric Power Corporation (NHPC), the turnkey contractor. The construction of civil works of both the dam and power house have been completed. The first spin of unit-III was done on 13th April, 2001.

Erection of other 2 units of Kurichu H.E. Project (3x15+1x15 MW) is at an advanced stage. For the 4th unit, all the Electrical & Mechanical (E&M) works are under progress.

● Eastern Bhutan 132 KV Transmission Grid Project

The 132 kV Transmission Grid is being developed for evacuation of power from Kurichu Hydro Electric Project to meet the local demand and supply the surplus power to India.

Work of construction supervision of infrastructure works, transmission line (72 km), substations (7 Nos.) are at final stage of completion.

The other projects in Bhutan include Gelephu-Tintibi-Nganglam 132 kV Single Circuit Transmission Line Project (123 km); Kilikhar-Lhuentse 132 kV Single Circuit Transmission Line Project (48 km); Improvement and Upgradation of Transmission System Project and Sub Transmission Distribution System Project.

PROJECTS IN ZIMBABWE

● Hwange Thermal Power Station (TPS) Phase-II Upgrade Project (920 MW) and Engineering Services of Experts for O&M of TPS

WAPCOS completed successfully the consultancy services for Engineering, Project Management and Supervision to Completion of Hwange TPS Phase-II Upgradation Project and received appreciation of Zimbabwe Electricity Supply Authority.

Subsequent to major breakdown of operational machinery, ZESA has called for experts’ services to retrieve the operations to normal efficient and optimum generation. Accordingly, the contract was extended to July, 2001.
INDIAN PROJECTS

During the year under review the major projects secured by this centre include Kol Dam Topographical and Geo-Technical Investigation, Design of seepage-arresting system with curtain grouting around ash dykes of NTPC’s Talcher & Korba Thermal Power Projects in Madhya Pradesh and Orissa; Study Report of Liquefied Natural Gas (LNG) Storage Capacity for Dabhol Power Corporation (DPC) Power Plant at Dabhol in Maharashtra; Development of 168 MW Shahpurkandi H.E. Project in Punjab; Tender Engineering, detailed design and construction supervision of Mansi Wakal Dam, Stage-I in Udaipur, Rajasthan; Design of ash slurry disposal system for UPSEB’s Anpara Thermal Power Plant and the work is in progress. Final reports were submitted pertaining to Upgradation of Detailed Project Report (DPR) of Kol Dam H.E. Project; Investigation, Planning and Design of Kerala Water Authority’s dam (Kakkadavu); Chiplima-B’ H.E. Project in Orissa; Hirakud-‘B’ H.E. Project in Orissa and Area drainage study for protection of NTPC’s Farakka STPP-II and adjoining villages from flooding in West Bengal.

INDIAN NATIONAL COMMITTEE ON IRRIGATION & DRAINAGE (INCID)

WAPCOS serves as the main secretariat for the Indian National Committee on Irrigation & Drainage (INCID). WAPCOS continued to provide secretarial assistance to INCID during the year under review. INCID, inter alia, continued monitoring of ongoing research schemes and processing new proposals for sanctioning funds by the Ministry of Water Resources.

PERSONNEL AND HUMAN RESOURCES MANAGEMENT

The total regular manpower (Group-wise) of the Company as on 31st October, 2001 indicating separately SCs/ STs/ OBCs/ Physically Handicapped employees is given in the enclosed annexure. The figures shown in the attached sheet does not include the number of contract employees, deputationists working in the Company from different organisations of the Government of India/ State Irrigation Departments/State Electricity Boards and Consultants, whose services have been utilised to provide a higher degree of technical know-how to match the technological development in different fields of specialisation for implementation of contract and consultancy assignments, both within the country and abroad. The Company has utilised 294 man-months by engaging persons on deputation, consultants and on contract basis.

The technical know-how possessed by the Consultants are utilised in diversified fields such as survey and investigation, ground water development, dam safety, computer based data decision support system, inland waterways, socio-economic surveys, ports & harbours, renewal and new source of energy, management training projects, environmental engineering etc. The Company has made continuous efforts for reducing the dependency on the deputationists and consultants by getting their technical know-how transferred to its
regular incumbents and has been successful. Our regular Engineers handle projects independently and services of Consultants are utilised only for higher technical know-how and guidance in very crucial works. The recruitment of Engineer Trainees, and Contract Engineers etc. has been continued in the Company in order to develop its own cadre and to attract young talent.

APPOINTMENT OF HANDICAPPED, EX-SERVICEMEN AND WEAKER SECTION

The Company follows Government guidelines/instructions on reservation policy for SCs/ STs/ OBCs/ Physically Handicapped/ Ex-servicemen etc. Accordingly, efforts are made to recruit persons belonging to these categories as per reservation quota fixed for them. Officers belonging to SC/ST communities are also co-opted in the DPC/Selection Committees. Relevant rosters, as prescribed by the Government, are maintained for plotting the reservation for these categories of candidates. The recruitment of minorities and their representation on the Selection Committees are given due consideration. The instructions given by the Government under the 15-point programmes for minorities are being followed by the Company in the recruitment process.

APPOINTMENT OF DISABLED PERSONS

The Company follows Government’s instructions on reservation of posts/vacancies for physically Handicapped. Accordingly, 3% of posts/vacancies (1% for each Orthopaed, Blind & Hearing Handicapped) are reserved to be filled up by Physically Handicapped persons. Physically Handicapped persons are given facilities, concession & relaxation at the time of test/interview as per rules on the subject matter. Physically Handicapped employees are also given facilities & relaxation as per Government’s rules.

REDRESSAL OF STAFF GRIEVANCES

A separate Grievance Cell is also functioning to deal with the day-to-day grievance matters of Officers/Staff working in the Company. Accordingly, the Company has appointed one of its senior officer as Staff Grievance Director who has been vested with powers to call for files/papers in respect of grievances and to take a decision to settle these with the approval of Chairman & Managing Director. The Staff Grievance Director is available to hear the grievances personally on every Wednesday in the week for redressal of grievances complaints.

As on 1.4.2001, there was no pending grievance case in the company

COMPLAINT MECHANISM FOR WOMEN

The Complaint Mechanism set up by the Company to deal with the complaints of sexual harassments of women employees at workplace is in existence and the rules framed to run the Mechanism are also intact.
However, no complaint of such nature was pending on 1.4.2001 and no further case was received till 31.10.2001.

**VIGILANCE ACTIVITIES**

The Vigilance Unit of WAPCOS is headed by the Chief Vigilance Officer/Chief Engineer (P&D) which reports directly to Chairman & Managing Director. During the year under review, WAPCOS has followed all the instructions and directives issued by the Ministry of Water Resources/Central Vigilance Commission/ Department of Public Enterprises from time to time to strengthen all aspects of Vigilance administration. Periodical returns were furnished in time and all the cases of complaints and inquiries were promptly attended to. An Essay Writing Competition on the subject of “Corruption is Anti-National, Anti-Poor and Anti-Economic Development” was organised in which WAPCOS employees took active part during the vigilance awareness week (31.10.2001-6.11.2001).

**OFFICIAL LANGUAGE IMPLEMENTATION ACTIVITIES**

To create an awareness about use of Hindi in Official work of the Company, Hindi Fortnight

*Vigilance Awareness Week celebrated during 31st October, 2001 to 6th November, 2001.*
from 1st September to 14th September, 2001 was observed in WAPCOS under the guidance of CMD. All officers/employees of WAPCOS were requested to do their maximum official work in Hindi especially during the Hindi Fortnight so as to encourage them to do more and more work in Hindi in future and to create a favourable atmosphere in the Company to promote progressive use of Hindi as the Official Language.

During this period, Hindi Essay writing, Hindi Stenography, Hindi Typewriting competitions were organized and a special short duration official language cash award scheme was also constituted. Officers from Ministry of Water Resources were also invited on this occasion, Officers/Staff took part in these programmes in large numbers. Prizes will be distributed to all eligible participants in due course.

A special Hindi Seminar for Engineers was also organised on 12th September, 2001 on a technical subject “Increasing Problems and Solution of Water”. The seminar was presided over by CMD, WAPCOS. The occasion was also graced by the presence of ED(WR), GM(P&A), GM(F), GM(D) and other Senior...
Officers of WAPCOS. Shri J.L. Chugh, Dy. Secretary from Ministry of Urban Development was invited as a special guest and was appreciative of the programme. This programme was coordinated by Manager(OLI).

During the fortnight a Hindi Workshop was organized on 7th Sept., 2001 in which 19 officers/employees participated. In this workshop participants were apprised of the Official Language Policy, Official Language Act & Official Language Rules in detail & practical training was also imparted to them. A meeting of the Departmental Official Language Implementation Committee (DOLIC) was also held during this period.

Emphasis was laid on ensuring compliance of the provisions of Section 3 (3) of the Official Languages Act and on increasing correspondence in Hindi. Efforts were also made to persuade, motivate and encourage officers and employees to do their maximum official work in Hindi. To facilitate use of Hindi in official work, several standard drafts and notes were made available for day-to-day use either in Hindi or in bilingual form.

Meetings of Departmental Official Language Implementation Committee were held regularly and progress made in the implementation of the annual programme and other orders/instructions of the Government of India relating to use of Hindi in Official work was reviewed in these meetings.

Pay slips, which are issued to officers/employees every month, continued to be issued in bilingual form in a computerized format. Apart from this, Contributory Provident Fund (CPF) statements to Officers/employees of the Company were also issued in bilingual form in a computerized format.

Three Hindi Workshops were organized during the year for imparting practical training in noting/drafting in Hindi to the Officers/Employees. In these Workshops Officers and employees actively participated.

To create interest in use of Hindi in official works a quarterly in-house Magazine in Hindi started in 1996, continued to be brought out regularly during the year covering Company’s all activities/achievements and other items of news value.
HIGHLIGHTS

● Presently, the National Projects Construction Corporation (NPCC) Limited is working on 123 project sites, which include River Valley Projects, Hydro Electric Projects, Thermal Projects, Industrial and Environment Projects.

● During the year, the Corporation has already secured new works of the value of Rs. 135.29 crores upto December, 2001 against the annual target of Rs. 135.00 crores despite several constraints.

● The Order Book Position of the Corporation at the end of December, 2001 was Rs. 413.61 crores.

● 37 Units out of 85 working Units exceeded the Financial & Physical targets set for them in respect of Turn Over in adverse conditions both financially & physically.
ORGANISATION AND ITS OBJECTIVES

The National Projects Construction Corporation Limited (NPCC) was established in the year 1957 as a construction company to provide the necessary manpower and know-how for the construction of Canal Systems, Irrigation and River Valley Projects, Dams and Barrages, Hydro-electric, Thermal Power, Industrial Structure, Surface Transport, Bridges and Flyovers, Building and Townships and Airfields etc. In its existence of over 44 years, the Corporation has been associated with 170 Projects of national importance all over the country involving some at the most remote and hazardous locations. The Corporation has also successfully executed several overseas projects in the Middle East Countries, Nepal and Bhutan.

TURNOVER

The turnover of the Corporation during the last five years and the target for the current year 2000-2001 is given below:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TURNOVER (Rs. in Crores)</th>
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<tbody>
<tr>
<td>1996-97</td>
<td>122.10</td>
</tr>
<tr>
<td>1997-98</td>
<td>116.89</td>
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<td>142.41</td>
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<td>2000-2001</td>
<td>144.66</td>
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<tr>
<td>2001-2002</td>
<td>78.84</td>
</tr>
<tr>
<td>(Up to December, 2001)</td>
<td>125.00 (Target)</td>
</tr>
</tbody>
</table>

NEW WORKS SECURED

Despite several constraints in tendering, Corporation has secured new works for Rs.316.84 crores as detailed below:

(A) Year 2000-2001 Rs.181.55 Crores against target of Rs.135.00 Crores.

(B) Year 2001-2002 Rs.135.29 Crores (Up to December, 2001) against total target of Rs.135.00 Crores.

Order Book Position as on 31.12.2001 was Rs.413.61 Crores.

NPCC has been awarded the works of Rs.41.82 Crores from Assam Rifles in North East Region looking into the past performance of NPCC at Dimapur Hospital Works.

NPCC is trying to bag the works of 12 MW Seriui Hydro Power Project in consortium with M/s. Technopromexpert of Russia. Negotiations are also under way for work of sewerage disposal scheme for the state of Mizoram and Water Supply of Chowra Head works at Cochin in state of Kerala. NPCC has entered into MOU with M/s. P.B. Consultant in association with LLEWEL YNDAVIES, Bhargava & Associates Pvt. Ltd. for development of master plan layout of Greater Ranchi in the state of Jharkhand.
Proposal for Sewerage Scheme for Meerut Cantt. submitted to Meerut Cantonment Board (UP) is under active consideration.

**PROJECTS COMPLETED**

The following projects were completed by NPCC Ltd., during 2000-2001 and up to December 2001 in 2001-2002:

- Bakreshwar Dam Project at Birbhum District in West Bengal.
- Heavy & Mechanical Repair Bay, Light & Running Repair Bay for 60 Diesel Loco at Angul Railway in Talcher District, Orissa.
- National Aluminium Company (NALCO) Expansion works in Damanjodi District, Orissa.
- 17 No. Primary schools in Puri District, Orissa.
- Balance works of Manjari Bridge across river Krishna in Karnataka.
- 3 No. bridges in Vellore District, Tamil Nadu.
- Interior works for NALCO in New Delhi.
- Construction of Ogee spillway at Tigra Dam in Gwalior District, Madhya Pradesh.
- Lining of Sharda Sahayak canal in Sitapur District, Uttar Pradesh.
- Construction of Indrasagar Diversion tunnel in Khandwa District, Madhya Pradesh.
- Construction of boundary wall for Power Grid at Pusauli in Bihar.
- Civil works for LPG shed of Hindustan Petroleum Corporation Limited (HPCL) at Patna in Bihar.
- Development of sectors for Delhi State Industrial Development Corporation (DSIDC) at Narela in Delhi.
- Construction of boundary wall, Guest House, GM Bungalow, D-type quarters, field hostel for NTPC at Faridabad Gas Power Project (FGPP) Faridabad District, Haryana.
- Construction of 160 No. residential quarters for Bhabha Atomic Research Centre (BARC) at Tarapur, Maharashtra.
- Construction of Type-I & Type-II quarters for Assam Rifles at Shillong in Meghalaya.

**WORKS UNDER EXECUTION**

At present, the Corporation is working in 85 Units/123 Project Sites spread all over the country. These include Irrigation and River Valley Projects, Hydro Electric Projects, Thermal Projects, Industrial Projects and other miscellaneous projects. Some of the projects in hand are as follows:
(a) IRRIgATION AND RIVER VALLEY INDENTATION PROJECTS

Jobat Dam, Datia Canal, Tigra Dam and Spillway at Gwalior, Ajnal Aqueduct & Escape Channel and Cross Regulator in Madhya Pradesh. Ponnai Barrage in Andhra Pradesh, Dolaiabhi Barrage, Khuga Dam & Spillway in Manipur, Mailakcherra Diversion Scheme, Sonaicherra Diversion Scheme, Dorraicherra Diversion Scheme, Monnaicherra Scheme and Muhari Irrigation Project in Tripura, GFCC Mokama in Bihar and Footiwar Aqueduct in Uttar Pradesh.

(b) HYDROELECTRIC PROJECTS

Koteshwar Diversion Tunnel in Uttaranchal.

(c) THERMAL PROJECTS


(d) INDENTATION INDUSTRIAL PROJECTS & ENVIRONMENT PROJECTS

Thiruvananthapuram Sewerage Scheme at Thiruvananthapuram in Kerala. Storm Water Drain & Water Supply Lines at Bagalkot in Karnataka, Replacement of Pipe Lines for Delhi Jal Board at Shahdra in Delhi, Sewerage Work in Gwalior in Madhya Pradesh. Reservoir Cum Pumping station water treatment at Kalyani, Switchyard foundation etc. at Durgapur in West Bengal and New Blade at BHEL Haridwar in Uttaranchal.

(e) MISCELLANEOUS PROJECTS

The Corporation has undertaken several construction assignments relating to Buildings, Roads, Hospitals, Bridges, and Flyovers etc. These include 62 Schools in Behrampur and Keonjhar Districts of Orissa, Road Over Bridge at Trichy, Vellore Bridge at Vellore and Kanchipuram Bridge in Tamilnadu. Fries School Complex at Bijapur in Karnataka. Department of Telecommunications (DOT) Building, Guwahati in Assam. Fisheries College at Agartala, Re-inforced Cement Concrete (RCC) Bridge at Kawamara and New capital complex at Agartala in Tripura. Bailey Bridge over Chubi Nallah at Doyang, Assam Rifles Quarters at Ukhrul and Assam Rifles Hospital at Dimapur in Nagaland. Torsa River Bridge at Cooch Bihar, Bondelgate Flyover at Kolkata and Regional Engineering College (REC) Durgapur, Tamluk Digha Rail Link Project and Garfa Reservoir at Kolkata in West Bengal, Building Complex at Central Institute of Plastic Engineering & Technology (CIPET) at Hazipur, and Police Lines Quarters at Khagaria in Bihar, Hindon Bridge and Krishak Bhartiya Co-operative (Kribhco) Township at Noida in Uttar Pradesh. Railway Over Bridge at Champa in Madhya Pradesh.

**TRAINING**

With a view to sharpen skill and enhancement of knowledge, besides enhancing working efficiency, training programmes are of utmost importance. But, in view of financial crisis in the Corporation, the employees are being sponsored for training which are without financial liability and fee.

**VOLUNTARY RETIREMENT SCHEME**

During the period 01.01.2001 to 31.12.2001 a total of 137 employees had exercised option under Voluntary Retirement Scheme, out of them 53 employees have been relieved from the services of Corporation and 84 employees request are pending due to non availability of Voluntary Retirement funds NRF (National Renewal Fund). Their requests will be sanctioned and relieved after receipt of funds from Government.

**VIGILANCE AND DISCIPLINARY CASES**

During the year upto December, 2001, 39 Vigilance cases were dealt with (28 old and 11 new), in which Minor Penalty proceedings in 6 cases have been completed and 8 Major Penalty proceedings involving 12 Officers are in progress. 13 Vigilance cases were investigated for initiating disciplinary proceedings. In addition to this, 9 cases were investigated by the CBI in consultation with Vigilance Division of the Corporation.

In respect of Disciplinary Cases during the year (January-December, 2001), disciplinary proceedings in all 31 are in progress. 13 disciplinary proceedings have been completed out of 39 cases and 5 new cases have started during this period.

**REDRESSAL OF STAFF GRIEVANCES**

- **No. of grievances pending as on 01.04.2001**: 75
- **No. of grievances received during 01.04.2001 to 31.12.2001**: 06
- **No. of grievances disposed of during the year**
  - (a) In favour of the applicants: Nil
  - (b) Not in favour of the applicants: Nil
- **No. of grievances pending as on 31.12.2001**: 81
## STAFF STRENGTH OF THE MINISTRY OF WATER RESOURCES
### (AS ON 31.01.2002)

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<th>Group C</th>
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</table>

* In group C post, two physically handicapped (PH) employees are also OBC and SC.
** In Group D post, one physically handicapped (PH) employee is also OBC.
ANNEXURE-II

ORGANISATIONAL CHART OF THE MINISTRY OF WATER RESOURCES
AS on 1.1.2002

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>C.A.</td>
<td>Controller of Accounts</td>
</tr>
<tr>
<td>2.</td>
<td>C.V.O.</td>
<td>Chief Vigilance Officer</td>
</tr>
<tr>
<td>3.</td>
<td>DIR.</td>
<td>Director</td>
</tr>
<tr>
<td>4.</td>
<td>Sr. J.C.</td>
<td>Senior Joint Commissioner</td>
</tr>
<tr>
<td>5.</td>
<td>D.S.</td>
<td>Deputy Secretary</td>
</tr>
<tr>
<td>6.</td>
<td>J.C.</td>
<td>Joint Commissioner</td>
</tr>
<tr>
<td>7.</td>
<td>U.S.</td>
<td>Under Secretary</td>
</tr>
<tr>
<td>8.</td>
<td>DY. C.A.</td>
<td>Deputy Controller of Accounts</td>
</tr>
<tr>
<td>9.</td>
<td>D.C.</td>
<td>Deputy Commissioner</td>
</tr>
<tr>
<td>10.</td>
<td>S.E.O.</td>
<td>Senior Evaluation Officer</td>
</tr>
<tr>
<td>11.</td>
<td>S.A.(W.S.)</td>
<td>Senior Analyst (Work Study)</td>
</tr>
<tr>
<td>12.</td>
<td>Sr. A.O.</td>
<td>Senior Accounts Officer</td>
</tr>
<tr>
<td>13.</td>
<td>A.D.</td>
<td>Assistant Director</td>
</tr>
<tr>
<td>14.</td>
<td>A.C.</td>
<td>Assistant Commissioner</td>
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<tr>
<td>15.</td>
<td>R.O.</td>
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<td>A.E.</td>
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<td>17.</td>
<td>D.O.</td>
<td>Desk Officer</td>
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<td>PR. Cell</td>
<td>Public Relation Cell</td>
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<td>23.</td>
<td>B&amp;T</td>
<td>BUDGET &amp; TECHNICAL</td>
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<td>B.M.</td>
<td>BASIN MANAGEMENT</td>
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<td>25.</td>
<td>M.I.</td>
<td>MINOR IRRIGATION</td>
</tr>
<tr>
<td>26.</td>
<td>E.A.</td>
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<tr>
<td>27.</td>
<td>E.R.</td>
<td>EASTERN RIVER</td>
</tr>
<tr>
<td>28.</td>
<td>P.P.</td>
<td>POLICY &amp; PLANNING</td>
</tr>
<tr>
<td>29.</td>
<td>G.W.</td>
<td>GROUND WATER</td>
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<tr>
<td>30.</td>
<td>O.L.</td>
<td>OFFICIAL LANGUAGE</td>
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<td>31.</td>
<td>A.G.</td>
<td>AGRICULTURE</td>
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<td>32.</td>
<td>P.G.</td>
<td>PUBLIC GRIEVANCES</td>
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<tr>
<td>33.</td>
<td>FIN.</td>
<td>FINANCE</td>
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<td>34.</td>
<td>ESTT. / E.</td>
<td>ESTABLISHMENT</td>
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<td>35.</td>
<td>I.</td>
<td>INDUS</td>
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<tr>
<td>36.</td>
<td>PR.</td>
<td>PROJECTS</td>
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<tr>
<td>37.</td>
<td>C</td>
<td>COORDINATION</td>
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<tr>
<td>38.</td>
<td>STAT.</td>
<td>STATISTICS</td>
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<td>39.</td>
<td>VIG.</td>
<td>VIGILANCE</td>
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<td>40.</td>
<td>CAD</td>
<td>COMMAND AREA DEVELOPMENT</td>
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<tr>
<td>41.</td>
<td>L.O. for O.B.C.</td>
<td>LIAISON OFFICER for BACKWARD CLASS</td>
</tr>
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<td>42.</td>
<td>LO for SC &amp; ST</td>
<td>LIAISON OFFICER for SCHEDULE</td>
</tr>
<tr>
<td>43.</td>
<td>WO &amp; SGO</td>
<td>CAST &amp; SCHEDULE TRIBE</td>
</tr>
<tr>
<td>44.</td>
<td>AG.E.</td>
<td>WELFARE OFFICER &amp; STAFF GRIEVANCES OFFICER</td>
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<tr>
<td>45.</td>
<td>AGRO.</td>
<td>AGRICULTURE ENGINEERING</td>
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## ANNEXURE-III

**LIST OF POSTAL ADDRESSES OF HEADS OF ORGANISATIONS UNDER THE MINISTRY OF WATER RESOURCES**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Organisation</th>
<th>Name of Head of Organisation</th>
<th>Telephone</th>
<th>Fax</th>
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<tbody>
<tr>
<td></td>
<td><strong>Attached Offices</strong></td>
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<tr>
<td>2.</td>
<td>Central Soil and Materials Research Station, Hauz Khas, New Delhi.</td>
<td>Dr. K.Venkatachalam, Director</td>
<td>6961894</td>
<td>6853108</td>
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<tr>
<td></td>
<td><strong>Subordinate Offices</strong></td>
<td></td>
<td></td>
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<tr>
<td>1.</td>
<td>Farakka Barrage Project, P.O. Farakka Barrage, Murshidabad – 742212, West Bengal.</td>
<td>Shri B.P. Singh, General Manager</td>
<td>03512-24216, 03152-27231, 03485-53644</td>
<td>03512-24216</td>
</tr>
<tr>
<td>2.</td>
<td>Ganga Flood Control Commission, Sinchai Bhavan, Patna – 800 015</td>
<td>Shri S.K. Das, Chairman</td>
<td>0612-222294</td>
<td>0612-233591</td>
</tr>
<tr>
<td>5.</td>
<td>Bansagar Control Board, Rewa, Madhya Pradesh</td>
<td>Shri S.K. Haldar, Secretary</td>
<td>07662-55418</td>
<td>07662-42433</td>
</tr>
<tr>
<td>#</td>
<td>Organization</td>
<td>Contact Person</td>
<td>Phone Numbers</td>
<td>Additional Information</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------</td>
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</tr>
<tr>
<td>6.</td>
<td>Sardar Sarovar Construction Advisory Committee, 4th Floor, A Block, Narmada Bhavan, Indira Avenue, Vadodara – 390 001.</td>
<td>Shri Indra Raj, Secretary</td>
<td>421438, 421272</td>
<td>0265-467262</td>
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<tr>
<td>1.</td>
<td><strong>Public Sector Undertakings</strong></td>
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<td></td>
<td>Water and Power Consultancy Services (India) Limited, ‘Kailash’, 26, Kasturba Gandhi Marg, New Delhi.</td>
<td>Shri P.L. Diwan, Chairman and Managing Director</td>
<td>3313881, 3313502</td>
<td>3314924</td>
</tr>
<tr>
<td>2.</td>
<td>National Projects Construction Corporation Limited, Raja House, 30-31, Nehru Place, New Delhi.</td>
<td>Shri S.C. Bali, Chairman and Managing Director</td>
<td>6884842, 5231269, 5238031</td>
<td>231271, 238031</td>
</tr>
<tr>
<td>1.</td>
<td><strong>Registered Societies</strong></td>
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</tr>
<tr>
<td></td>
<td>National Institute of Hydrology, Jal Vigyan Bhavan, Roorkee.</td>
<td>Dr. K.S. Ramasastri, Director</td>
<td>01332-72106, 01332-73976</td>
<td>01332-72123</td>
</tr>
<tr>
<td>1.</td>
<td><strong>Statutory Bodies</strong></td>
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<tr>
<td></td>
<td>Narmada Control Authority, BG-113, Scheme No. 74/C, Vijay Nagar, Indore –452 008</td>
<td>Shri Suresh Chandra, Executive Member (Addl. Charge)</td>
<td>0731-557276</td>
<td>0731-559888</td>
</tr>
<tr>
<td>4.</td>
<td>Tungabhadra Board, P.O.Tungabhadra Dam, Bellary –583 225.</td>
<td>Shri V.K. Jyoti, Chairman</td>
<td>08394-3021605, 08394-39112</td>
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</table>
LIST SHOWING BUDGET ESTIMATES/ REVISED ESTIMATES OF VARIOUS SCHEMES AND PROGRAMMES OF THE MINISTRY FOR 2001-2002

(Rs. in crore)

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<tr>
<td></td>
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<td>Plan</td>
<td>Non-Plan</td>
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<tr>
<td>1</td>
<td>Secretariat-Economic Services</td>
<td>1.74</td>
<td>10.95</td>
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<td>I</td>
<td>MAJOR AND MEDIUM IRRIGATION</td>
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<tr>
<td>1</td>
<td>Central Water Commission</td>
<td>20.58</td>
<td>76.25</td>
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<tr>
<td>2</td>
<td>Central Soil &amp; Materials Research Station</td>
<td>6.53</td>
<td>4.06</td>
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<tr>
<td>3</td>
<td>Central Water &amp; Power Research Station</td>
<td>6.27</td>
<td>19.35</td>
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<td>4</td>
<td>National Water Development Agency</td>
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<tr>
<td>5</td>
<td>National Institute of Hydrology</td>
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<td>6</td>
<td>Research and Development Programme</td>
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<td>7</td>
<td>National Projects Construction Corporation Limited</td>
<td>1.00</td>
<td>14.00</td>
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<td>8</td>
<td>Sutlej Yamuna Link Canal Project</td>
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<td>8.00</td>
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<td>9</td>
<td>Boards &amp; Committees</td>
<td>0.00</td>
<td>2.90</td>
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<tr>
<td>10</td>
<td>Water &amp; Power Consultancy Services (India) Limited</td>
<td>0.00</td>
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<tr>
<td></td>
<td><strong>Total: Major &amp; Medium Irrigation</strong></td>
<td>56.14</td>
<td>127.79</td>
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<tr>
<td>II</td>
<td>MINOR IRRIGATION</td>
<td></td>
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<tr>
<td>1</td>
<td>Central Ground Water Board</td>
<td>89.18</td>
<td>44.43</td>
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</table>
### 2. Surface Water Schemes
- **R & D Programme**: 0.39
- **Total**: 7.01

### 3. R & D Programme
- **Minor Irrigation**: 6.00
- **R & D Programme**: 0.75
- **Total**: 96.58

### IV. Command Area Development
1. **Command Area Development Programme**: 186.79
2. **R & D Programme**: 0.40
- **Total**: 187.19

### V. FLOOD CONTROL
1. **Central Water Commission**: 31.37
2. **Flood Control in Brahmaputra and Barak Valley**: 25.00
3. **Brahmaputra Board**: 20.00
4. **Flood Proofing Programme**: 1.00
5. **Ganga Flood Control Commission**: 2.09
6. **Emergent Flood Protection measures in Eastern and Western Sectors**: 2.05
7. **Pagladia Dam Project**: 27.00
8. **Survey & Investigation of Kosi High Dam Project**: 1.00
9. **Maintenance of flood protection works of Kosi and Gandak Projects**: 3.71
10. **Pancheshwar Multipurpose Project**: 8.35
11. **Manas Sankosh Project**: 0.48
12. **Joint Observation on common rivers with Nepal and Bangladesh**: 1.00
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</thead>
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<tr>
<td>13.</td>
<td>Critical anti-erosion works in Ganga Basin States and raising &amp; strengthening of embankments along Kosi and Gandak</td>
<td>20.00</td>
<td>0.00</td>
<td>25.77</td>
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<td>14.</td>
<td>Harrange Drainage Scheme</td>
<td>1.85</td>
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<td>1.85</td>
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<td>15.</td>
<td>Extension of embankments on Lalbageya, Kamla, Bagmati and Khando rivers</td>
<td>3.00</td>
<td>0.00</td>
<td>2.00</td>
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<td>16.</td>
<td>Critical anti-erosion works in Coastal and other than Ganga Basin States</td>
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<td>0.00</td>
<td>2.00</td>
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<td>17.</td>
<td>Improvement of Drainage in Mokama Group of Tals</td>
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<td>0.00</td>
<td>2.39</td>
<td>0.00</td>
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<td>18.</td>
<td>Schemes for the benefit of North Eastern States &amp; Sikkim</td>
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<td></td>
<td>- Brahmaputra Board</td>
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<td>0.00</td>
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<td></td>
<td>- Flood Control in Brahmaputra and Barak Valley</td>
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<td>0.00</td>
<td>0.01</td>
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<tr>
<td></td>
<td>- Pagladia Dam Project</td>
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<td>- Harrange Drainage Scheme</td>
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<td><strong>Total</strong></td>
<td><strong>0.00</strong></td>
<td><strong>0.00</strong></td>
<td><strong>0.01</strong></td>
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<td></td>
<td><strong>Total: Flood Control</strong></td>
<td><strong>148.85</strong></td>
<td><strong>35.88</strong></td>
<td><strong>140.96</strong></td>
<td><strong>34.53</strong></td>
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<td>VI.</td>
<td><strong>TRANSPORT SECTOR</strong></td>
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<td>1.</td>
<td>Farakka Barrage Project</td>
<td>21.50</td>
<td>22.47</td>
<td>20.00</td>
<td>21.70</td>
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<td><strong>Total</strong></td>
<td><strong>512.00</strong></td>
<td><strong>241.52</strong></td>
<td><strong>462.00</strong></td>
<td><strong>252.64</strong></td>
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<td>VII</td>
<td><strong>ACCELERATED IRRIGATION BENEFIT PROGRAMME</strong></td>
<td>2000.00</td>
<td>0.00</td>
<td>2000.00</td>
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<td></td>
<td><strong>Grand Total</strong></td>
<td><strong>2512.00</strong></td>
<td><strong>241.52</strong></td>
<td><strong>2462.00</strong></td>
<td><strong>252.64</strong></td>
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## ANNEXURE – V

**LIST OF POSTAL ADDRESSES OF DIRECTORS OF PUBLIC/ STAFF GRIEVANCES IN THE MINISTRY OF WATER RESOURCES AND ITS VARIOUS ORGANISATIONS**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the organization</th>
<th>Name &amp; Designation</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ministry of Water Resources, Government of India.</td>
<td>Shri J.S. Burjia, Joint Secretary (A) &amp; Director (Public Grievances)</td>
<td>Room No. 403, IV Floor, Shram Shakti Bhavan, Rafi Marg, New Delhi-110001 TELEFAX No. 011-3710343</td>
</tr>
<tr>
<td>2.</td>
<td>Ministry of Water Resources, Government of India.</td>
<td>Shri Inderjit Singh, Deputy Secretary (Coord.) &amp; Director (Staff Grievances)</td>
<td>Room No. 216, II Floor, Shram Shakti Bhavan, Rafi Marg, New Delhi-110001 Tel. No. 3717129 Fax No. 3710253</td>
</tr>
<tr>
<td>3.</td>
<td>Central Water Commission, New Delhi.</td>
<td>Shri M.E. Haque, Secretary</td>
<td>Central Water Commission, Room No. 313(S), Sewa Bhavan, R.K. Puram, New Delhi-110066 TEL. No. 011-6187232 FAX No. 011-6195516</td>
</tr>
<tr>
<td>4.</td>
<td>Central Soil &amp; Materials Research Station, New Delhi.</td>
<td>Shri S. S. Brar, Chief Research Officer</td>
<td>Central Soil &amp; Materials Research Station, Room No 309, Hauz Khas, New Delhi 110016 TEL. No. 6850015 FAX No. 6853108</td>
</tr>
<tr>
<td>5.</td>
<td>Farakka Barrage Project, Farakka Barrage.</td>
<td>Shri D.P. Singh, Superintending Engineer</td>
<td>Farakka Barrage Project, Circle No. I, P.O.-Farakka Barrage,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distt. Murshidabad (W.B)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Pin Code 742212</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>TEL. No. 03485 53222, 03512-24216</td>
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<td></td>
<td>FAX No. 03512-24216</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Ganga Flood Control Commission, 3rd Floor, Sinchhai Bhavan, Patna-800015</td>
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<tr>
<td></td>
<td></td>
<td>TEL. Nos. 0612-221899, 225960</td>
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<tr>
<td></td>
<td></td>
<td>FAX Nos. 0612 224895(O), 233591(O)</td>
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<tr>
<td>7.</td>
<td>Central Water &amp; Power Research Station, Khadakwasla (Pune)</td>
<td>Dr. I. D. Gupta, Joint Director</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Central Water &amp; Power Research Station, P.O. Khadakwasla Research Station, Pune-411024</td>
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<tr>
<td></td>
<td></td>
<td>TEL. No. 020-4392825</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FAX No. 020-4392004</td>
<td></td>
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<td>8.</td>
<td>Central Ground Water Board, Faridabad.</td>
<td>Shri A.K. Agarwal, Deputy Director (Stat.)</td>
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<tr>
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<td></td>
<td>Central Ground Water Board, NH IV, Faridabad</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>TEL. No. 5419084</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>FAX No. 5412524</td>
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<tr>
<td>9.</td>
<td>Sardar Sarovar Construction Advisory Committee, Vadodara</td>
<td>Shri N. K. Bhandari, Deputy Secretary</td>
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<td></td>
<td></td>
<td>Sardar Sarovar Construction Advisory Committee, Narmada Bhavan, ‘A’ Block, 4th Floor, Indira Avenue, Vadodara-390001</td>
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<tr>
<td></td>
<td></td>
<td>TELEFAX No. 0265-437262</td>
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<tr>
<td></td>
<td>Organization</td>
<td>Contact Person</td>
<td>Details</td>
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<tr>
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</table>
ANNEXURE - VI

DETAILED ASSESSMENT OF PERFORMANCE FOR THE YEAR 2001-2002 IN RESPECT OF THE AUTONOMOUS ORGANISATIONS UNDER THE MINISTRY OF WATER RESOURCES

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>NATIONAL WATER DEVELOPMENT AGENCY</td>
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<tr>
<td>2.</td>
<td>NATIONAL INSTITUTE OF HYDROLOGY</td>
</tr>
<tr>
<td>3.</td>
<td>BRAHMAPUTRA BOARD</td>
</tr>
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</table>
DETAILED ASSESSMENT OF PERFORMANCE OF NATIONAL WATER DEVELOPMENT AGENCY, NEW DELHI

The erstwhile Ministry of Irrigation (now Ministry of Water Resources) and the Central Water Commission had prepared in the year 1980 a National Perspective Plan (NPP) for optimum development of Water Resources of the country which comprised two components: (1) peninsular Rivers Development Component and (2) Himalayan Rivers Development Component.

National Water Development Agency (NWDA) is carrying out the feasibility studies of the NPP proposals on a scientific basis which inter-alia envisage diversion of water from surplus basins to deficit/drought prone areas of the country by interlinking major rivers of the country. The proposal includes construction of storage reservoirs to store flood waters and interlinking of river systems for optimum utilization of available water resources. The water so diverted will be used for irrigation, drinking and other uses.

Peninsular Rivers Development Component of NPP consists of four major parts: (i) Interlinking of Mahanadi-Godavari-Krishna-Cauvery rivers and building storages at potential sites in these basins, (ii) Interlinking of west flowing rivers, north of Mumbai and south of Tapi, (iii) Interlinking of Ken-Chambal Rivers & (iv) Diversion of other west flowing rivers towards east.

Himalayan Rivers Development Component of NPP envisages construction of storage reservoirs on the principal tributaries of the Ganga and the Brahmaputra in India, Bhutan and Nepal, along with interlinking canal systems to transfer surplus flows of the eastern tributaries of the Ganga to the west, apart from linking of the main Brahmaputra and its tributaries with the Ganga and Ganga with Mahanadi. It will also provide the necessary discharge for augmentation of flows at Farakka required inter-alia to flush the Calcutta Port & inland navigation facilities across the country.

PHYSICAL PERFORMANCE

A. Peninsular Component

Under the Peninsular Component, NWDA has already completed data collection and water balance studies of 137 basins/sub-basins and at 52 identified diversion points, toposheet studies of 58 identified storages and 18 toposheet studies of link alignments and prepared prefeasibility reports of 17 water transfer links.

Based on the above water balance studies and prefeasibility reports, NWDA has identified 16 interbasin water transfer link proposals for the preparation of feasibility reports under Peninsular Component (Annexure-1).

Presently, the work of field surveys and investigations for preparation of feasibility reports of link schemes is on hand. Feasibility reports of the following five links have already been completed.
1. Ken-Betwa Link  
2. Par-Tapi-Narmada Link  
3. Pamba-Achankovil-Vaippar Link  
4. Godavari (Polavaram)-Krishna (Vijayawada) Link  
5. Krishna (Srisailam)-Pennar Link

The feasibility report of one more link, namely Krishna (Nagarjunasagar)-Pennar (Somasila) link has been completed and is programmed to be circulated before March, 2002. The feasibility reports of the other two links namely, Damanganga-Pinjal and Krishna (Almatti)-Pennar are also programmed to be completed by March, 2002. The topographical surveys for preparation of feasibility report of two links namely, Cauvery (Kattalai)-Vaigai-Gundar and Parbati-Kalisindh-Chambal were completed during the year 2001-2002. In addition to this, topographical surveys for Pennar (Somasila)-Cauvery (Grand Anicut) link are programmed to be completed by March, 2002. Besides, topographical surveys for preparation of feasibility reports in respect of three links, namely, Mahanadi (Manibhadra)-Godavari (Dowlaiswaram), Godavari (Inchampalli Low Dam)-Krishna (Nagarjunasagar Tail Pond) and Godavari (Inchampalli)-Krishna (Nagarjunasagar) remained under progress.

B. Himalayan Component

Under the Himalayan Component, NWDA has already completed water balance studies at 19 diversion points, toposheet studies of 19 link alignments and prepared prefeasibility reports of 14 water transfer links.

Based on the above water balance studies and prefeasibility reports, NWDA has identified 14 interbasin water transfer link proposals for the preparation of feasibility reports under Himalayan Component (Annexure-II).

During the year 2001-2002, topographical surveys for preparation of feasibility reports of two links namely, Sarda-Yamuna and Ghagra-Yamuna (Indian territory) were completed. In addition to this, topographical surveys for Chunar-Sone Barrage link is programmed to be completed by March, 2002. Besides, topographical surveys for preparation of feasibility reports in respect of 4 links namely, Manas-Sankosh-Tista-Ganga, Ganga-Damodar-Subernarekha, Yamuna-Rajasthan and Sone Dam-Southern Tributaries of Ganga remained under progress. During the year, survey and investigations for preparation of feasibility report for 2 links namely, Subernarekha-Mahanadi and Rajasthan-Sabarmati were initiated.

It is programmed by NWDA to complete the feasibility reports of all the identified water transfer link schemes under Peninsular and Himalayan Components by the year 2004 and 2008 respectively.

Implementation of the interbasin water transfer link schemes can be taken up in a phased manner depending on the priorities of the Government and availability of funds. But
before this, certain other steps viz. negotiations and agreements amongst the States involved in interbasin transfer, preparation of detailed project reports (DPRs), techno-economic appraisal of DPRs and investment clearance of the schemes, funding arrangements and fixing of agencies for execution etc. would be necessary. For implementation of the above link schemes, a Perspective Plan has been drawn up by NWDA envisaging specific time frame for each of the above steps required towards implementation. However, the whole programme of implementation would depend on the seriousness of the States involved to arrive at consensus regarding sharing of surplus water over and above their own needs and the cooperation extended by them to achieve the objectives of interbasin water transfer. In order to further speed up the process towards implementation of the link schemes, NWDA has prepared detailed ‘Action Plans for Implementation’ of five links which are identified as intra-basin links or those involving one or two States only. The concerned States could concentrate on these links and expedite the process of negotiations amongst themselves so that the work of preparation of the DPRs could be taken up.

The implementation of the above programme of interbasin water transfer is expected to provide additional irrigation benefits of 35 million hectare i.e. 25 million hectare from surface waters and 10 million hectare from increased use of ground waters which will be over and above the ultimate irrigation potential of about 140 million hectare envisaged from major, medium and minor irrigation projects and would generate 34 million KW of power, apart from the benefits of flood control, navigation, water supply, fisheries, salinity and pollution control etc.

**FINANCIAL ASPECT**

Initially, peninsular Rivers Development Component was taken up by NWDA when it was set up in 1982, it was estimated that Rs. 107.42 crores would be required for carrying out the various activities. In 1990 when the work of Himalayan Rivers Development Component was also included in the scope of activities of NWDA, the estimate was revised to Rs. 181.00 crores. The expenditure incurred by NWDA since inception upto March, 2001 was Rs. 95.87 crores. During the year 2001-2002, the budget allocation was Rs. 15.00 crores and revised budget estimate is Rs. 14.50 crores. The actual expenditure incurred during the year 2001-2002 upto 31.12.2001 is Rs. 9.64 crores.
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<td>Godavari (Inchampalli) – Krishna (Nagarjunasagar) Link</td>
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<td>Godavari (Inchampalli Low Dam) – Krishna (Nagarjunasagar Tail Pond) Link</td>
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<td>Krishna (Nagarjunasagar) – Pennar (Somasila) Link</td>
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<td>Krishna (Srisailam) – Pennar (Prodattur) Link</td>
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<td>Krishna (Almatti) – Pennar Link</td>
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<td>8</td>
<td>Pennar (Somasila) – Cauvery (Grand Anicut) Link</td>
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<td>9</td>
<td>Cauvery (Kattalai) – Vaigai – Gundar Link</td>
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<td>Parbati – Kalisindh – Chambal Link</td>
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<td>Damanganga – Pinjal Link</td>
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<td>12</td>
<td>Par – Tapi – Narmada Link</td>
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<td>Ken – Betwa Link</td>
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<td>14</td>
<td>Pamba – Achankovil – Vaippar Link</td>
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<td>15</td>
<td>Bedti – Varda Link</td>
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<tr>
<td>16</td>
<td>Netravati – Hemavati Link</td>
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</table>
**ANNEXURE – II**

**LIST OF WATER TRANSFER LINKS UNDER HIMALAYAN RIVERS DEVELOPMENT COMPONENT FOR WHICH FEASIBILITY REPORTS ARE TO BE PREPARED BY NWDA**

<table>
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<td>Gandak – Ganga Link</td>
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<td>4.</td>
<td>Ghagra – Yamuna Link</td>
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<td>6.</td>
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<td>7.</td>
<td>Rajasthan – Sabarmati Link</td>
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<td>8.</td>
<td>Chunar – Sone Barrage Link</td>
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<td>9.</td>
<td>Sone Dam – Southern Tributaries of Ganga Link</td>
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<td>10.</td>
<td>Brahmaputra – Ganga Link (Manas–Sankosh-Tista-Ganga)</td>
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<td>11.</td>
<td>Brahmaputra – Ganga Link (Jogigopa-Tista-Farakka)</td>
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<td>*12.</td>
<td>Farakka – Sunderbans Link</td>
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<td>13.</td>
<td>Ganga (Farakka) – Damodar – Subernarekha Link</td>
</tr>
<tr>
<td>14.</td>
<td>Subernarekha – Mahanadi Link</td>
</tr>
</tbody>
</table>

* Survey & investigations to be done by West Bengal Government.
DETAILED ASSESSMENT OF PERFORMANCE OF NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE

The National Institute of Hydrology (NIH) was set up in 1979 with its Headquarters at Roorkee by the Government of India as nucleus for Studies & Research in the area of Hydrology. The main objectives for which the Institute was established are:

(i) to undertake, aid, promote and coordinate systematic and scientific work in all aspects of hydrology;

(ii) to co-operate and collaborate with other national, foreign, and international organisations in the field of hydrology;

(iii) to establish and maintain a research and reference library in pursuance of the objectives of the Society and equip, the same with books, reviews, magazines and other relevant publications, and

(iv) to do all other such things as the NIH Society may consider necessary, incidental or conducive to the attainment of the objectives for which the institute has been established.

The activities of the Institute are being carried out under overall direction of the National Institute of Hydrology Society under the Presidentship of the Union Minister of Water Resources and Governing Body under the Chairmanship of the Secretary, Ministry of Water Resources. The Institute’s research and other technical activities are monitored and guided by the Technical Advisory Committee under the Chairmanship of Chairman, Central Water Commission.

The Institute’s activities are being carried out at the Headquarters, Roorkee and its six Regional Centres (at Belgaum, Guwahati, Jammu, Patna, Kakinada and Sagar). Besides, basic and applied research and studies, the Institute is also involved in Technology Transfer and sponsored / consultancy research.

The Institute is also providing secretariat to the Indian National Committee on Hydrology & Asian Regional Coordinating Committee on Hydrology. The Indian National Committee on Hydrology is an apex body with the responsibility of coordinating the various activities concerning Hydrology in the country. After Indian National Committee on Hydrology was transferred to the Institute since 1982, the activities of Indian National Committee on Hydrology has increased manifold. The Chairman, Central Water Commission is the Chairman of Indian National Committee on Hydrology, Asian Regional Coordinating Committee on Hydrology the Committee on Asia level, formed for ensuring regional cooperation within the framework of the Indian National Committee on Hydrology (earlier called International Hydrology Project (IHP)) UNESCO.
The Institute’s activities, work programme, progress, outputs are being continuously reported and monitored regularly by the Technical Advisory Committee, Governing Body, NIH Society, Working Groups, Regional Coordination Committee & Indian National Committee on Hydrology. Periodically the achievements have also been reviewed in a very comprehensive manner by the Achievements Review Committees constituted by the Ministry of Water Resources for this purpose. The first such Committee was constituted in 1988 and second in 1994. Both these Committees have recommended for further strengthening, expansion and diversification of the Institute’s activities as well as the relationship of staff cadre pattern on the lines of other R&D organisations. The Achievements Review Committee (1994-1999) submitted its report to the President of NIH society on 26.04.2000 where the work done by the Institute was highly appreciated.

Overall Performance during the year 2001-2002

● Scientific & Research Activities

The Institute’s activities are carried out by 18 scientific divisions at the Headquarters and its six regional centres. During the year, scientists and scientific staff of the Institute have published more than 85 research papers and 70 technical papers in international and national journals, and proceedings of international and national conferences & symposia etc.

● Technology Transfer

Under the technology transfer programme besides publication and circulation of the technical reports, the Institute organises short duration training courses and workshops on different topics relevant to the fields of engineers at Roorkee and in States. During the year, the Institute has organised six workshops.

● Development of Laboratories and Equipments

The laboratories at the headquarters as well as at Regional Centre are being developed and strengthened by procuring equipments for Water Quality, Remote Sensing, Hydrometeorology Soil & Water, Nuclear Hydrology and Computer Laboratories. These equipments are being used for carrying out field and laboratory investigations.

● Research & Consultancy Project

The Institute is also assisting several organisations in the country for solving various complex and typical field problems through sponsored projects and consultancy projects. During the year 2001-2002, the work has been continuing on six ongoing projects. Besides this, the Institute also undertook three new sponsored projects during the year. Four sponsored projects, which were taken up in earlier years were completed.

● Buildings

The Administrative Building and roads were
completed at Kakinada. Extension of Field Hostel at headquarters was also completed. Further, extension of library and construction of Auditorium at headquarters is under progress and is expected to be completed during the year.

- **Flood Management**

Major Flood affected areas of the country lie in the Ganga, Brahmaputra and Barak basins. In view of the greater emphasis given to Flood Studies, the Ministry of Water Resources has given its approval for the establishment of National Institute of Hydrology Centre for Flood Management Studies for Brahmaputra basin at Guwahati and Ganga basin at Patna. Accordingly, the North Eastern Regional Centre at Guwahati was renamed as National Institute of Hydrology Centre for Flood Management studies for Brahmaputra basin and Ganga Plain, North Regional Centre at Patna renamed as National Institute of Hydrology Centre for Flood Management studies for Ganga basin.

In meetings at these centres, five year work programme of the Centre and proposed technical and scientific activities has been finalised based on deliberation and suggestions of the various experts.

- **Proposal mooted for Drought Management Studies**

There is a need to develop modern technique like expert systems and decision support system for planning and management of drought strategies. In view of this, for long term drought amelioration, proposals were mooted to the Ministry of Water Resources, Government of India, for establishment of National Institute of Hydrology centres for Drought Management Studies at Belgaum and Sagar.

- **Scientific Studies**

Extensive scientific studies were undertaken by the National Institute of Hydrology to analyse and model the phenomenon of Arsenic contamination in ground water in the affected areas of West Bengal.

A number of studies were taken up in the North Eastern region on different aspects of Hydrology with focus on Flood problems of Brahmaputra basin.

- **Hydrology Project**

The main role of National Institute of Hydrology in the Hydrology Project funded by the World Bank is to strengthen and expand the Institute’s capabilities for training to serve the important objectives in the Hydrology Project namely, (i) Modernisation and improvement of Data collection and processing procedure and (ii) Use of Computer & Software for Hydrology Data Management.

Accordingly, one referesh course, one training course on HYMOS (name of a software) and two training courses on Basic Hydrology were held during the year for officials of Central/ State Government organisations covered under the Hydrology Project.
### Finance Outlay

(Rs. in crores)

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<td>Non Plan</td>
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<td>3.21</td>
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DETAILED ASSESSMENT OF PERFORMANCE OF BRAHMAPUTRA BOARD, GUWAHATI

(A) Master Plans

(1) Completed and awaiting approval from the Board. - 3 Nos.
   ● Khowai, Ghiladhari and Jinjiram sub-basin Master Plan.

(2) Completed and to be circulated - 1 No.
   ● Moridhal sub-basin Master Plan

(3) Under Preparation - 5 Nos.
   ● Dhaleswari (Bhairabi), Haora, Subansiri, Jhanji and Gaurang Sub-basin Master Plan.

(4) Under Survey and Investigation -16 Nos.
   ● Gabharu, Dipota, Belsiri, Sankosh, Gadadhar, Tipkai, Burigang, Tangani, Bargang, Brahmajan, Bhogdoi, Dhubnoi-Krishnai, Dhansiri, Beki-Manas-Aie, Kuls-Deosila and Barnadi sub-basin Master Plan.

(B) Drainage Development Schemes (DDS)

1. No Objection Certificate received for execution - 5 Nos.
   ● Barbang, East of Barpeta, Jengrai, Joysagar and Jakaichuk DDS

2. Technical Clearance awaited from the CWC - 3 Nos.
   ● Kailashahar, Singla and Rudrasagar DDS

3. DPR under modification as per suggestions from CWC/State Govt. - 6 Nos.
   ● West of Barpeta, Rangsa, Sessa, Demow, sonai and Konwarpur DDS

4. DPR under preparation - 12 Nos.
   ● Ghiladhari, Larsing, Laru-Jamira-Sessa, Punir, Badri, Bherekibil, Gelabil, Mora-Pichalamukh, Pakonia, Mora-Dekrong, Namdang and Sukhsagar DDS

5. Project under investigation - 3 Nos.
   ● Tingrai, Sessa-Pathar and Dharmanagar DDS

6. Project under execution - 1 No.
   ● Harang Drainage Development Scheme
     (a) Construction of sluices - 5%

(C) Project

1. Under Survey and preparation of DPR - 5 Nos.
   ● Kulsi, Lohit, Kynshi(Jadukata), Dibang and Noa-Dehing dam project

2. Under Execution - 2 Nos.
   (i) Pagladiya Dam Project:
      (a) Pre-construction investigation for preparation of construction design, drawings and specifications.
Drilling of 4 nos. of bore holes out of 10 bore holes suggested by expert team has been completed.

Dam alignment survey completed on the right bank of the river Pagladiya.

(b) Design, drawings and construction specifications.

The works have been assigned to the CWC and 5 different directorates are working on the detailed construction design, drawings and specifications including preparation of tender documents in association with the Brahmaputra Board. The CSMRS, New Delhi & CWPRS, Pune are also associated for fixing various design parameters.

(c) Re-settlement and Rehabilitation:

- Out of total requirement of approximate 3250 Ha, the Govt. of Assam has identified 2500 Ha for resettlement of the project affected families. All the identified land has not been found to be suitable for settlement. After physical verification, about 1350 Ha has been found to be suitable. The Govt. of Assam has allotted 289 Ha. to the project authority up till now.

- Land acquisition proposal for construction of the project have been submitted by the district administration, Nalbari to Brahmaputra Board and these proposal have been duly forwarded to the Revenue Department of Govt. of Assam. Notification for one village has been issued.

- The joint survey by the district administration, Nalbari and Board for Zirath etc. started.

(d) Security Arrangement:

- At present 28 nos. Armed Home Guard including 1 Sub-Inspector of Armed Assam Police is deployed at Angarkata PGR where 200 Ha. of land has been allotted to Board for R&R.

- 23 Nos Armed Home Guard including Armed Assam Police personnel have been deployed at Thalkuchi Dam site.

- One company of CRPF is being posted in Thalkuchi for general Law and Order.

- Assam Government has been requested to provide one company of Armed Assam Police battalion in the project site exclusively for Board’s works.

(e) Infrastructure

- Improvement of Bridges and Culverts from both Tamulpur and Dhamdaha site taken up.

- Construction of a B.U.G. Bridge – 35m Span over Geruanala on the Khagrabari – Kadamtala – road have been initiated.

- Office complex at Dam site at Thalkuchi and Angarkata have been initiated.

- Development of Project Head quarter initiated.

(f) Construction Organization.

- Project Chief Engineer’s Office is functioning at Nalbari.

- One Superintending Engineer, 5 Executive Engineers with requisite Sub-division offices have been placed.

(ii) Construction of one No. Raised platform (R&D scheme). Work is in progress.
(D) North Eastern Hydraulic and Allied Research Institute (NEHARI)

During the year 2001-2002 laboratory testing works taken up by NEHARI as below:

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<th>Project Authority</th>
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**Rock Mechanics Laboratory**

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<td>Myntdu Leshka HE Project</td>
<td>Meghalaya Electricity Board</td>
<td>Work completed and report submitted</td>
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**Hydraulic Laboratory**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Project</th>
<th>Project Authority</th>
<th>Status</th>
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<tr>
<td>1</td>
<td>Physical Model Testing of Jiadhal River (Phase-II)</td>
<td>North Eastern Council</td>
<td>32%</td>
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