



**Chapter 3**

**Department Centric Audit**

**Department Centric Audit of  
Narmada Valley Development  
Authority**

## CHAPTER-III

### Narmada Valley Development Department

#### 3.1 Department Centric Audit of Narmada Valley Development Authority

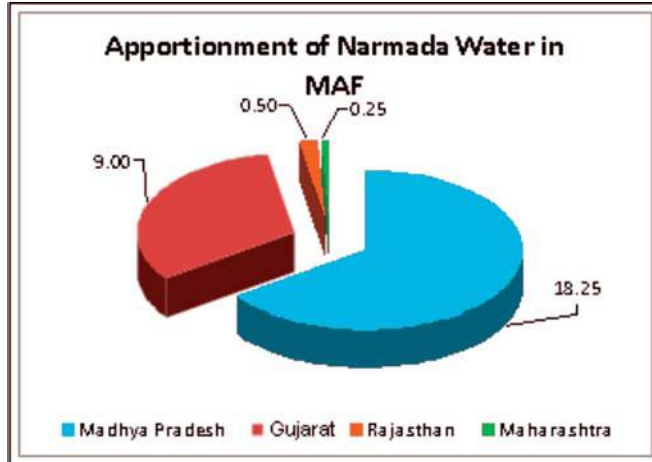
##### Highlights

Narmada river, originates from Amarkantak Hill in Shahdol district and flows westwards over a length of 1,312 km before draining through the Gulf of Cambay (Khambhat) into the Arabian Sea in the Bharuch district of Gujarat State. As there were disputes over the sharing of water among the riparian States, the Government of Gujarat submitted (July 1968) under the Inter State Water Dispute Act, 1956, a formal complaint to the Ministry of Water Resources for sharing of Narmada water and a tribunal (NWDT) was set up in 1969 to adjudicate in the matter of sharing of water. According to the award of tribunal in December 1979 Madhya Pradesh was to get 18.25 MAF of water of Narmada. This was to be reviewed by the NWDT in 2024. For expeditious development of irrigation facilities in the Narmada basin, the Government of Madhya Pradesh established (July 1981) Narmada Valley Development Department (NVDD). In July 1985, planning and execution of major projects in the Narmada Valley was entrusted to the multi disciplinary authority of the Narmada Valley Development Department (NVDA). So far, 11 dams for 13 major projects across the Narmada and its tributaries for storage of 9.114 Million Acre Feet water and canal system for utilisation of 3.1565 Million Acre Feet water could be completed. A department centric audit on Preparedness of State for tapping of Narmada Water as per Narmada Water Dispute Tribunal award revealed:

- There were slippages in planning for utilisation of Narmada water due to slow progress by the contractor, delay in obtaining environment clearances and delay in preparation of resettlement and rehabilitation plans.  
*(Paragraph 3.6)*
- There were delays in completion of all the components of projects execution resulting in cost overrun and non-completion of dams as well canals and distribution system.  
*(Paragraph 3.7)*
- Delays in approval of drawing, design and Detailed Project Reports (DPRs) were due to non-submission of reports in prescribed format, incomplete information, inadequate drawings etc.  
*(Paragraph 3.7.2)*
- Delays in obtaining environment clearances were due to submission of incomplete information to the Ministry of Environment and Forest (MOEF), delay in preparation and submission of Environment Impact Analysis/Environment Management Plan.  
*(Paragraph 3.7.3)*
- The delays in acceptance of tenders and award of work contributed to delays in completion of projects.  
*(Paragraph 3.7.6)*

- Execution of canals works were delayed mainly due to slow progress by contractors, delays in land acquisition in few reaches, inadequate estimates and execution of works in a phased manner for different reaches instead of taking up execution of all the reaches simultaneously.  
*(Paragraph 3.7.7 (ii))*
- The scheduled completion period of 18 to 36 months in respect of eight turnkey contracts had already lapsed. All the works were however, incomplete as of August 2012 after delays of 12 to 20 months.  
*(Paragraph 3.7.7(iii))*
- Survey works for medium and minor projects (2.677 Million Acre Feet for 710000 ha) in remaining portion of the Narmada basin (Amarkantak to Handia gauge) was not awarded as of August 2012.  
*(Paragraph 3.8)*
- After lapse of more than 33 years from the date of award of the Tribunal, total utilisation of water was only 5.51 Million Acre Feet during the water year ending June 2012 against the allotted share.  
*(Paragraph 3.9)*
- After imposition of the ceiling by State Planning Commission, Narmada Valley Development Authority has not so far planned to tie up funds for bridging the gap of ₹ 11002 crore required for completion of remaining projects.  
*(Paragraph 3.10)*

### 3.1 Introduction



The Narmada river, the fifth longest river in India, covers 20 districts of Madhya Pradesh (MP). It originates from Amarkantak Hill in Shahdol district and flows westwards over a length of 1,312 km before draining through the Gulf of Cambay (Khambat) into the Arabian Sea

Source: Information provided by NVDA

in the Bharuch district of Gujarat State. As there were disputes over the sharing of water among the riparian States, the Government of Gujarat submitted (July 1968) under the Inter State Water Dispute Act, 1956, a formal complaint for sharing of Narmada water to Ministry of Water Resources, Government of India.

Narmada Water Disputes Tribunal (NWDT) was constituted in October 1969 to adjudicate upon the dispute regarding sharing of Narmada water. The

Tribunal determined the utilisable quantum of Narmada waters to be 28 million acre feet (MAF) at 75 per cent dependability and allocated it among the four riparian states through its award (Award) in December 1979 as detailed in the table below:

Table No: 3.1

Quantity of water	Madhya Pradesh	Gujarat	Rajasthan	Maharashtra	Total
(in MAF)	18.25	9.00	0.50	0.25	28.00
(in Million Cubic Metre)	22511.01	11101.32	616.74	308.37	34537.44
Ratio	73	36	2	1	

(Source: Information provided by NVDA)

The award further provided:

- That apportionment was to be done on the basis of actual withdrawals and not consumptive use<sup>1</sup>.
- That within its share of water, each party State was free to make such changes in the pattern of water use and in the areas to be benefited within or outside the Narmada basin in its territory as it may consider necessary.
- Review at any time after a period of 45 years from the date of publication (December 1979) of the decision of the Tribunal in the Official Gazette, with regard to the equitable allocation of water.

**Thus, the State of Madhya Pradesh has to ensure that the allocated share of 18.25 MAF water is fully utilised by creation of necessary infrastructure by 2024 to avoid reallocation of unutilised water during review by the NWDT in or after 2024.**

The Narmada Valley Development Department (NVDD) was created in 1981 with the objective of executing major irrigation and multipurpose projects in the Narmada Valley. Execution of irrigation projects till 1985 was undertaken by the Government of Madhya Pradesh through the Irrigation Department.

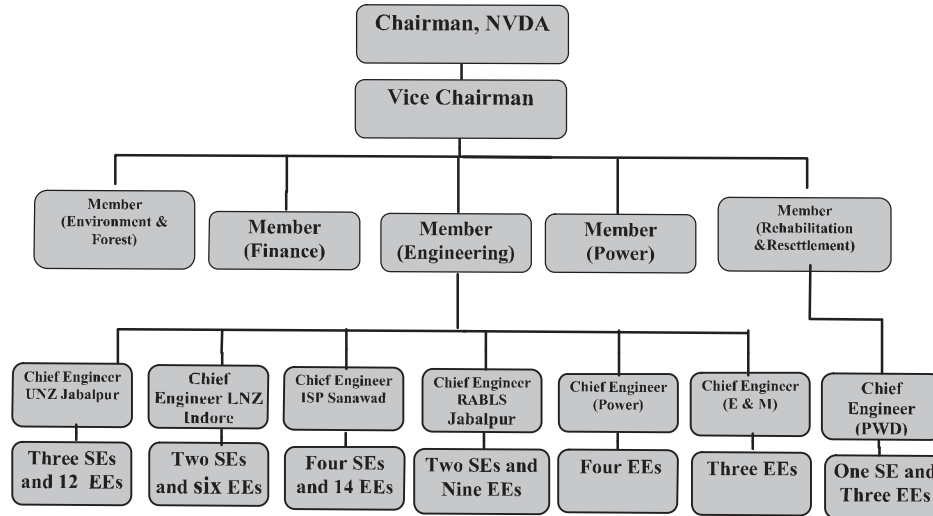
The NVDA was constituted in July 1985 for specific purpose of planning the construction of hydropower and irrigation projects in Narmada Basin and execution of major irrigation projects for utilisation of apportioned share of Narmada water before review year of the NWDT award. The organisation is mandated to meet its manpower requirements by recruitment through deputation from other Government Departments and re-employment of retired personnel besides hiring of consultants for a fixed period.

### 3.2 Organisational set-up

NVDA is headed by the Minister of State in the Government, who is ex-officio Chairman of NVDA. The Chairman is assisted by the Vice Chairman,

<sup>1</sup> Consumptive use of water means water utilised from available supplies without return to a water resources system for reuse (e.g. water used in agriculture is not returned to a stream, river).

who is the Chief Executive Officer in charge of the day to day affairs of NVDA. Vice Chairman is assisted by Member (Rehabilitation & Resettlement), Member (Finance), Member (Engineering), Member (Power) and Member (Environment and Forest). Member (Engineering) is supported by four Chief Engineers (two at Jabalpur and one each at Indore and Sanawad) who in turn are assisted by the Superintending Engineers and Executive Engineers at field level as shown in the organogram:-



### 3.3 Audit objectives

The department centric audit of NVDA was conducted to assess achievement of NVDA so far in completion of projects in Narmada basin and plan for completion of remaining projects by the review year. For this, Audit examined following aspects;

- Identification and planning of projects
- Implementation of projects activities as planned
- Utilisation of water in completed and ongoing projects
- Funding of the projects
- Monitoring of project execution

### 3.4 Audit criteria

The audit findings were based on the criteria drawn from provisions of;

- the award of the Tribunal, Master plan (1972), Madhya Pradesh Works Department (MPWD) Manual and Madhya Pradesh Financial Code (MPFC),
- Madhya Pradesh Karya Avantan Niyam (MPKAN), Vision documents (2012, 2015 and 2020), reverse calendar 2012 and

- provisions of the Forest (Conservation) Act, 1980, the Land Acquisition Act, 1894 and Guidelines for submission, appraisal and clearance of Irrigation and Multipurpose project, 2010 and
- reports of the Working Group on Minor Irrigation, Ministry of Water Resources, Government of India and Planning Commission.

### 3.5 Scope and methodology of audit

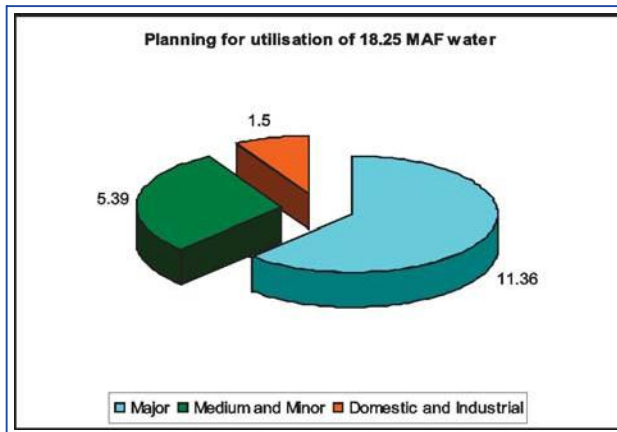
The department centric audit covered review of projects implemented so far, planning and implementation of the remaining projects and extent of utilisation of Narmada water. The department centric audit was conducted during June 2012 to September 2012.

The audit objectives, criteria and methodology were discussed with NVDA during entry conference in June 2012.

Audit findings were discussed in the exit conference held (December 2012) with the Vice Chairman, NVDA. Views of the Authority expressed in the exit conference have been included in this report. The audit findings were sent to the Government (October 2012). Their reply has not been received (March 2013).

### 3.6 Planning for utilisation of Narmada water

NVDA revised project completion period thrice and is now slated for completion by 2020-21.



Source: Information provided by NVDA

with cumulative capacity of 16.75 MAF for irrigation use and the remaining 1.5 MAF for domestic/industrial use as shown in the graph. The project wise details of proposed utilisation of 18.25 MAF water is shown in **Appendix 3.1**.

In December 2003, “Vision 2012” document for development of water resources through major projects in Narmada basin was prepared by NVDA.

<sup>2</sup> The projects having command area more than 10000 ha are classified as major projects, having command area between 10000 ha and 2000 ha are classified as medium projects and having command area less than 2000 ha are classified as minor projects.

According to the Vision document, all the major projects in Narmada basin were to be completed by the end of the 11<sup>th</sup> Five Year plan, i.e. up to the year 2011-12.

Due to slow progress, there were slippages in completion of major projects. Therefore, Vision 2012 was modified and a reverse calendar<sup>3</sup> was introduced in May 2007 to indicate all action necessary towards achieving the targets and efforts required to overcome shortfalls or bottlenecks. All major projects were planned for completion up to 2011-12 by undertaking construction of canal system simultaneously with construction of dams.

As there were further slippages, mostly due to delays in environment and forest clearances and approval of rehabilitation and resettlement plans, Vision 2015 document (published in 2009) was prepared with a view to complete all major projects by the year 2015. According to the Vision 2020, all the major projects have been planned for completion by 2021-22.

**NVDA could complete only two major projects for utilisation of 0.2045 MAF out of 18 projects to be completed by it.**

### 3.7 Status of implementation of major projects

Utilisation of allocated share of 18.25 MAF was planned through 23 major projects, 135 medium projects and 3000 minor projects. The status of implementation of major projects (**Appendix 3.2**) in Narmada Basin as of August 2012 is summarised in the table below;

**Table: 3.2**

Executing Agency	Number of project	Proposed water utilisation in MCM	Proposed water utilisation in MAF	Project status	Completion year
WRD	5	3641.39	2.952	Completed	Before 1988
NVDA	2 <sup>4</sup>	242.245	0.2045	Completed	2010-11
NVDA	7 <sup>5</sup>	7484.8	6.068	Ongoing	-
NVDA	2 <sup>6</sup>	312.93	0.2537	Tendering process	-
NVDA	7 <sup>7</sup>	1931.23	1.57	Yet to be taken up <sup>8</sup>	-
<b>Total</b>	<b>23</b>	<b>13612.595</b>	<b>11.05</b>		

As per Vision 2012 document of NVDA, twenty six dams (**Appendix 3.1**) were to be constructed under 23 major projects till end of 2011-12. As of August 2012, 11 dams of 13 major projects<sup>9</sup> (9.114 MAF) and canals system

<sup>3</sup> Reverse calendar: As the word denotes, target date of completion is set and all the activities are scheduled so as to complete the project by the target date.

<sup>4</sup> Man: 140.1 MCM and Jobat: 112.145 MCM

<sup>5</sup> RABLS: 1681 MCM, BDP : 2510.6 MCM, ISP: 1625.26 MCM, Omkareshwar (OSP): 1300 MCM, Upper Beda: 101.09 MCM, Punasa LIS 130.20 MCM and Lower Goi: 136.65 MCM = Total 7484.8 MCM (6.068 MAF)

<sup>6</sup> Halon: 134 MCM and Upper Narmada: 178.93 MCM = 312.93 MCM (0.2537 MAF)

<sup>7</sup> SMS: 486.600 MCM, Dudhi: 317.46 MCM, Morand Gunjal: 427.65 MCM, Upper Burner: 82.72 MCM, Ataria: 112.00 MCM, Chinki: 458.60 MCM and RRB: 46.20 MCM= 1931.23 MCM (1.57 MAF).

<sup>8</sup> There is net reduction of 0.31 MAF water in capacity of major projects after detailed survey for which there was no plan to bridge the gap.

<sup>9</sup> Tawa, Barna, Kolar, Sukta, Matiyri, RABLS, BDP, ISP, Punasa LIS, OSP, Man, Jobat. Upper Beda.



for utilisation of 3893.635 MCM water (3.157 MAF) had since been completed.

As per the reverse calendar, NVDA had identified the following major components in execution of major projects;

- Survey and investigation
- Drawings, designs and DPRs and approval from CWC
- Obtaining clearance MOEF
- Fixing of agency for execution of project including preparation of tender document, finalisation of tender and award of work for construction dams and canals.

Status of completion of various major components as identified in the action plan prepared by NVDA is discussed below:

### **3.7.1 Survey and investigation**

**Survey and investigation in respect of seven projects could not be completed.**

Survey and investigation activity includes site clearance for survey work, hydrological survey, dam alignment including grid survey, geological investigation survey, basin survey, construction material survey including testing, fixing of levels and submergence survey for resettlement and rehabilitation (RR) plans.

As of May 2007, out of 23 major projects survey and investigation was not completed in respect of seven major projects<sup>10</sup>. It was seen in audit that survey and investigation of these seven major projects was still in progress as of September 2012.

### **3.7.2 Drawings, designs and DPRs**

**There were delays in obtaining approval of DPRs from CWC.**

Drawings, designs and DPRs are prepared on the basis of detailed survey and investigation for which time period of three months has been provided in the reverse calendar. As per the Guidelines issued in 2010 by the Central Water Commission (CWC) for submission, appraisal and clearance of Irrigation and Multipurpose project, 18 weeks is required for examination of preliminary reports and six months for project appraisal by Central Water Commission (CWC).

As per the reverse calendar, approval of DPR component including drawing and design was to be completed in respect of the above said seven major Projects during 2007-08. Approval of DPR in respect of these projects could not be obtained from CWC even till September 2012. As observed in audit, the delays in obtaining approval from CWC were mainly due to non-submission of reports in prescribed format, incomplete information, inadequate drawings etc.

Keeping in view the past experience in approval of DPRs, NVDA will be able to complete these seven projects before the review year i.e. 2024 if it effectively addresses the shortcomings, such as, non-submission of reports in

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<sup>10</sup> Ataria, Chinki, Dudhi, Morand-Gunjaj, RRB, SMS, and Upper Burner.



prescribed format, incomplete information, inadequate drawings etc. noticed in the past in obtaining approval of DPRs.

In the exit conference NVDA stated (December 2012) that the Authority was tightening the blacklisting action and prequalification clause (in tender document) to ensure that the preparation of DPRs is completed by contractors on time.

### **3.7.3 Obtaining clearances from MOEF**

There were delays in obtaining clearance from MOEF for major projects.

Environment and forest clearance involves activities of site clearance, preparation of EIA/ EMP report, public hearing and final appraisal. As per the notification issued by MOEF in 2006, clearance from MOEF is expected in 27 months.

Out of the 23 major projects, clearance from MOEF in respect of 11 projects had been obtained prior to 2006-07. NVDA obtained clearance for five projects during 2007-12 as detailed below;

**Table: 3.3**

Sl. No.	Name of Project	Date of submission for approval	Date of Environment clearance	Time taken in Months
1	Upper beda	NA	16-07-2007	NA
2	Punasa LIS	16-07-2004	16-07-2007	36
3	Lower Goi	24-10-2002	17-01-2008	63
4	Upper Narmda	29-10-2001	10-09-2009	107
5	Halon	29-10-2001	04-01-2010	111

It is evident from above that time taken for clearance from MOEF was ranging from three years to nine years against expected 27 months as per the notification of 2006.

We noticed that there had been delays in respect of all the four activities envisaged for environment clearance (**Appendix 3.3**) in four out of five major projects cleared by MOEF during the period 2007-12, as summarised below;

- Site clearance activity should take approximately 180 days. Against this it took only 73 days in case of Punasa LIS whereas it took 432 days to 806 days in other three projects, the maximum of 806 days being in Upper Narmada.
- Preparation of EIA/EMP activity should take approximately 540 days. Against this it took only 129 days to 529 days in case of three Projects whereas in case of Upper Narmada Project it took 730 days.
- Public hearing activity should take approximately 90 days. Against this it took only 18 days in case of Upper Narmada whereas in case of three projects it took 145 days to 342 days.
- Final appraisal activity should take approximately 60 days to 90 days. Against this, it took 129 days to 773 days in all the four cases.

As observed in audit, main reasons for delays in obtaining environment clearances were submission of incomplete information to the MOEF, delay in preparation and submission of EIA/ EMP<sup>11</sup> and impact of the new notification

<sup>11</sup> EIA: Environment Impact Analysis and EMP: Environment Management Plan.

issued by MOEF in 2006 requiring prior environmental clearance from the concerned regulatory authorities<sup>12</sup>. In respect of remaining seven projects<sup>13</sup> for utilisation of 1.57 MAF water, the process for obtaining clearance was undertaken between March 2008 and June 2012 and clearance has not been received from MOEF as of August 2012.

Keeping in view the actual time taken in obtaining Environment and Forest clearance in the past ranged from three to nine years, clearances from the MOEF for the remaining seven projects before 2015-16 to 2020-21, will be difficult unless immediate steps are taken to overcome the impediments encountered in the past.

In the exit conference NVDA stated (December 2012) that process of environment clearance included preparation of DPRs, EIA/EMP study, public hearing and vetting from expert committee. It was further stated that laws for clearance had been changed and there were delays mainly on part of MOEF as it takes two to three years to complete the process.

The reply is not acceptable to the extent that submission of incomplete information and delay in preparation and submission of EIA/ EMP reports by the Authority to MOEF contributed to delays in clearance from MOEF. Besides, time taken by MOEF in clearance should also be factored in while making calendar for completion of projects.

#### **3.7.4 Preparation of tender document**

Tender documents are prepared after obtaining clearance from MOEF and technical sanctions from the competent authority. For this activity, a schedule of two months has been proposed in the reverse calendar 2012 for the remaining seven projects<sup>14</sup>.

Forms of tender documents for item rate contracts are standardised in the MPWD Manual which was adopted by NVDA. NVDA introduced (August 2005) turnkey contract system with a view to ensure timely completion of projects. Preparation of tender documents for turnkey contracts was generally outsourced to consultants. This activity either in case of item rate contracts or turnkey contracts had not created bottlenecks in implementation of programmes for projects.

#### **3.7.5 Land acquisition**

As per note 3 below paragraph 2.104 of MPWD Manual, notification for the acquisition of land required for any particular work must be submitted before the work is put in hand. In case of turnkey contracts, responsibility of preparing land acquisition cases has also been entrusted with contractors.

<sup>12</sup> The Ministry of Environment and Forests in the Central Government and the State Environment Impact Assessment Authority (SEIAA) in the State according to the category of projects.

<sup>13</sup> SMS, Dudhi, Morand-Gunjaj, Upper Budner, Chinki, RRB and Ataria.

<sup>14</sup> SMS, Dudhi, Morand-Gunjaj, Upper Budner, Ataria, Chinki and RRB. Out of 23 major projects, seven projects were completed, seven projects were ongoing and two projects were already in tendering process.

**There was no bottleneck in preparation of tender document.**

NVDA did not analyse delays in land acquisition for projects and did not consider it as a separate process in execution of a project during preparation of reverse calendar 2012. Thus, NVDA did not consider land acquisition a major bottleneck, while making its plan/calendar.

However, we observed that land acquisition had posed hurdles in timely completion of works in some projects (OSP, ISP, etc.) and in most other projects only in a small part of the whole land required and did not result in increasing the total duration of construction during the year 2007-12.

In the exit conference NVDA stated (December 2012) that land acquisition was a major bottleneck in some areas. Narmada Bachao Andolan (NBA) had created hindrances by way of court cases which were cleared only after verdict of Honble High Court and Honble Supreme Court and there were interference of international organisation and NGOs.

We however noticed that NBA mainly raised issues relating to rehabilitation and resettlement. Thus, preparation of plans/calendar without considering the possible impact of rehabilitation and resettlement in land acquisition would result in time over run in execution of projects affected by litigation and may result in non-completion of affected projects by the review year.

### **3.7.6 Fixing of agency**

**There were delays in acceptance of tenders and award of works which contributed to overall delay in completion of projects.**

As per clause 2.41 of draft Notice Inviting Tender (NIT) specified in Appendix 2.10 A of MPWD Manual, validity of offer is six months in case of tender accepted by the Chief Engineer. Thus, tender should normally be accepted within a period of six months from the date of submission of tender.

We noticed in test check of 128 agreements entered into between 2007-08 and 2011-12 relating to construction of canals that NVDA took 188 days to 347 days in 10 agreements for acceptance of tenders against the normal period of six months for its acceptance (**Appendix 3.4**). We further noticed that in 67 agreements detailed in **Appendix 3.5**, NVDA took 11 days to 426 days in issuance of work orders from the date of acceptance of tenders. These delays contributed to overall delay in the completion of works. Some of the contractors left the works incomplete. This caused further delays in completion of works due to extra time involved in retendering and award of works. This reflected mismanagement in execution of major projects.

In the exit conference NVDA stated (December 2012) that there was no delay in award of work and issue of work order for construction of dams.

The reply is not acceptable as the observations raised in audit relate to the delays in award of work in construction of canals.

Delays in acceptance of tenders and issuance of work orders contributed to delays in completion of work. NVDA has to strengthen its mechanism of evaluation of tenders and award of works to cut short the time being taken for award of contracts so as to ensure completion of the remaining projects before the review year. A computerised management information system having database of all contractors and works executed by them could provide assistance in finalising award of work to a capable contractor.

### 3.7.7 Execution of works

After clearance of projects by MOEF and preparation of DPRs, construction of dams take three to four years as provided in the reverse calendar. As planned in the reverse calendar, all the major projects in Narmada Basin were to be completed up to 2011-12. The target could not be achieved due to slippages in execution of works of dams as well as canals as detailed below;

#### (i) Dams

**NVDA could complete only two dams and transferred two dams to NHDC due to paucity of funds.**

WRD constructed five dams<sup>15</sup> (capacity: 2.952 MAF) across tributaries of Narmada river during the years 1956 to 1988 by taking time ranging from seven to 22 years as shown in **Appendix 3.6**.

NVDA completed construction of two dams (Man and Jobat) in 2006 and 2007, respectively by taking time of 20 to 23 years. Due to paucity of funds with NVDA, two dams<sup>16</sup> (2.477 MAF) were transferred (May 2000) to National Hydro Power Development Corporation (NHDC), that completed these projects within four years.

During 2007-12, one dam viz. Upper Beda (capacity: 101.09 MCM) was completed (2010) by NVDA in seven years against the scheduled period of completion of four years as per the reverse calendar. The delay was mainly due to delay in change of drawing by CWC.

Lower Goi dam (136.65 MCM) taken up for construction in February 2009 and scheduled to be completed in 36 months as per the reverse calendar was still in progress (March 2013). The delay was mainly due to slow progress by contractors.

Construction of 13 dams of nine major projects<sup>17</sup> for utilisation of 1.819 MAF water and dams of all the medium and minor projects for utilisation of 4.985 MAF water, were yet to be started.

Considering the delays in past in construction of dams of the projects, it may not be able to complete all of the remaining 13 dams by the review year unless NVDA effectively address the problems associated with the construction of dams, such as slow progress by the contractors and increase in quantities during execution.

In the exit conference NVDA stated (December 2012) that two dams were transferred to NHDC due to logistics of finance and human resources and one of the major dams, namely OSP, was completed within the short span of four years. NVDA further stated that the agency for Halon project would be fixed in next meeting of Narmada Control Board (NCB) and in Upper Narmada Project, affected families had lodged a court case. It was further stated that

<sup>15</sup> Barna, Kolar Matiyari Sukta and Tawa

<sup>16</sup> ISP dam, transferred to NHDC in the year 2000, was completed in 2005. OSP dam was constructed by NHDC within four years (2003 to 2007).

<sup>17</sup> Dudhi, Morand-Gunjaj, Upper Burhner, Chinki, Ataria, RRB, SMS, Halon and Upper Narmada.

tenders received for Halon Project was on higher side; therefore there was problem in accepting the tender.

The reply does not address the issues of delays due to slow progress by contractors and increase in quantities during execution. Moreover, the reply does not give details of plans to tackle the court cases by the project affected families and expeditious finalisation of tenders so as to complete construction of dams by the review year.

**(ii) Canals**

**NVDA could not complete canal networks of any major project during 2007-12.**

In the Vision 2015 document, NVDA estimated the time required for development of canals under major projects as five to six years.

Time taken in the construction of canals for completed projects, is detailed in the table below:

**Table No: 3.4**

Sl. No.	Name of Department	Name of Project	Projected use of water in MCM	Year of start of canal	Year of actual completion of canal	Time taken in years
1	WRD	Tawa	2386.72	1956	1998	42
2	WRD	Barna	559.82	1968	1997	29
3	WRD	Kolar	435.90	1979	1990	11
4	WRD	Sukta	170.57	1973	1985	12
5	WRD	Matiyari	88.38	1973	1985	12
6	NVDA	Man	140.10	1984	2006	22
7	NVDA	Jobat	112.15	1984	2007	23
<b>Total</b>			<b>3893.64</b>			

(Source: - Information provided by NVDA)

As evident from the above, WRD took 11 years to 42 years in construction of canals for five major projects for utilisation of 2.952 MAF water, while NVDA took 22 years to 23 years in construction of canals in two projects (Man and Jobat) for utilisation of 0.114 MAF and 0.902 MAF water, respectively.

Works of canals of seven major projects<sup>18</sup> started during 1991 to 2009 for utilisation of 6.068 MAF water, were still in progress (August 2012). Canals of two out of these seven major projects (ISP and BDP) started by NVDA in 1991 and 1996 for utilisation of 1.318 MAF and 2.035 MAF water, were still in progress with a cost overrun of ₹ 1016.01 crore and ₹ 4025.99 crore after lapse of 21 years and 16 years, respectively. Construction of canals of RABLS project was started in 1992 and four other projects<sup>19</sup> started during 2005 to 2009, were in progress. The percentage completion of canals of RABLS, BDP

<sup>18</sup> ISP, BDP, RABLS, OSP, Upper beda, Punasa LIS and Lower Goi

<sup>19</sup> OSP, Upper Beda, Punasa LIS and Lower Goi



and ISP was 99.90 per cent, 59.68 per cent and 54.38 per cent<sup>20</sup> in respect of main canal and 89.51 per cent, 21.55 per cent and 49.57 per cent in respect of distributaries and minors respectively as of June 2012. The works of canals were delayed mainly due to slow progress by contractors, delays in land acquisition in a few reaches, inadequate estimates and execution of works in a phased manner for different reaches instead of taking up execution of all the reaches simultaneously. Details in respect of these projects are shown in **Appendix 3.6**. Thus, NVDA could not complete canal network of any project during 2007-12.

NVDA may consider execution of canal works in all the reaches simultaneously instead of taking them up in a phased manner in different reaches as envisaged in reverse calendar. Remaining seven major projects (1.57 MAF water) can be completed prior to the review year 2024 if all the clearances are obtained latest by 2018-19, award of works and execution are undertaken immediately after obtaining clearances and there are no delays in execution beyond the scheduled completion period of approximately five years envisaged for these projects.

As all the activities of these seven major projects have to be completed during the remaining period up to 2024, NVDA has to deploy adequate and suitable manpower for evaluation of tenders, capability of contractors, feasibility and close monitoring of programme of execution of works by contractors to ensure completion within the programmed period. NVDA has to closely monitor the progress of works by contractors and delay in land acquisition in reaches affected by litigations and take steps that are necessary for timely completion.

In the exit conference NVDA stated (December 2012) that it was not practicable and advisable to take up the entire canal network at one go as the water flow is unidirectional. It was further stated that if contractors at tail end completed the work and head end remains incomplete then work at tail end would be ruined by the time work at the head was completed and only main canal works could be undertaken simultaneously.

The reply is not acceptable as reverse calendar envisaged execution of canal works including distributaries simultaneously to avoid delay in creation of irrigation facilities. The issue of contractors at the tail end completing the work, while the works at the head end remaining incomplete could be managed through project management techniques such as CPM and PERT.

<sup>20</sup>

	Main Canal and distributory			Distributory and minors		
	Total	Completed	percentage	Total	Completed	percentage
RABLS	135.5	135.37	99.90	1915.04	1714.06	89.51
BDP	270.705	161.57	59.68	1076.86	232.04	21.55
ISP	239.9	130.45	54.38	1228.11	608.74	49.57

**(iii) Introduction of turnkey contracts**

NVDA introduced (August 2005) turnkey contract system with some special conditions such as interest free mobilisation advance and machinery advance to enable contractors to immediately start works, deposit of Bank Guarantee (BG) towards performance security deposit, penalty for not achieving the specified milestone, incentive for early completion, preparation of cases for acquisition of land and its follow up, etc. The main objective for introducing turnkey system of contract was to complete projects by specialised firms within specified time frame and also to overcome the deficiencies/ hurdles noticed in item rate contracts.

We noticed that 37 turnkey contracts at total contract value of ₹ 5472.84 crore were entered into during 2007 to 2012 (**Appendix 3.7**) for construction of BDP, ISP, Lower Goi, Punasa LIS, Upper Beda (canal), and Omkareshwar (OSP) major projects including two contracts for survey and investigation of medium and minor irrigation projects. Of these, 19 contracts were for construction works, 12 contracts for consultancy services and six contracts for survey and investigation works. The scheduled completion period of 18 to 36 months in respect of eight turnkey contracts had already lapsed. All the works were however, incomplete as of August 2012 after delays of 12 months to 20 months (**Appendix 3.8**). The main reasons for delay in execution of works as observed in audit were insufficient resources deployed by the contractors, award of works to contractors who had defaulted in earlier contracts, slow progress by the contractors and poor monitoring by NVDA.

NVDA, with a view to avoid payment of escalation and to help better monitoring of projects decided (January 2012) to award works in small packages and reduced the completion period from 30 months to 18 months. Till August 2012, no work was awarded in small packages as envisaged.

In the exit conference NVDA stated (December 2012) that it learnt from past mistakes and floated new tenders on turnkey basis to execute the works of dams and canals simultaneously. NVDA further stated that imposition of penalty and payment of incentive had been linked with creation of irrigation potential.

In the reply, issues of deployment of insufficient resources by the contractors, award of works to contractors who had defaulted in earlier contracts and slow progress by the contractors were not addressed.

**3.8 Implementation of medium and minor irrigation projects**

To utilise 5.39 MAF water out of the award of the total 18.25 MAF water, construction of 135 medium and 3000 minor projects was planned.

As per Madhya Pradesh Karya Avantan Niyam as amended up to 1 January 2009, NVDA was entrusted with the work of preparation and execution of all irrigation projects in Narmada Valley excluding medium and minor projects and WRD was to execute construction of major, medium and minor irrigation projects other than in Narmada Basin. NVDA recommended (February 2004) modifications in Madhya Pradesh Karya Avantan Niyam for entrusting the works of medium and minor irrigation projects of Narmada Basin to NVDA.

Keeping in view the past achievements, it would be difficult for NVDA to complete the remaining 266 medium projects by the review year.



The proposal was still under consideration of the Government (August 2012). Thus, there was no specific mandate for construction of medium and minor irrigation projects in Narmada Basin. As of August 2012, 19 medium and 976 minor projects (**Appendix 3.9**) had been completed (0.405 MAF) which were constructed by WRD.

NVDA meanwhile took up (October 2008) survey and preparation of DPRs for medium and minor irrigation (MMI) projects (1.087 MAF water for 290000 ha) in Narmada Basin as detailed below:

**Table No: 3.5**

Sl. No.	Name of work	NIT no. & date	Probable amount of contract (₹ in crore)	Date of receipt of tender	Date of work order & due date of completion of work	Time extension up to
1	Survey work from Hadia gaze site to Omkareshwar site (Group -1) for 130000 ha	NIT No. 13/ 08-09 dt. 13.10.08	32.11	23.12.08	28.10.2009 27.04.2011	26.4.2012
2.	Survey work from Omkareshwar dam site to Gujarat state (Group 2) for 160000 ha	NIT No. 13/ 08-09 dt. 13.10.08	40.61	23.12.08	28.10.2009 27.04.2011	26.9.2012

(Source: - Information provided by NVDA)

The survey works, scheduled to be completed by April 2011, were in progress up to August 2012. The contractor submitted (August 2012) DPRs of 15 medium and 308 minor irrigation projects, of which 123 DPRs had been approved by the competent authority. As decided in the meeting (February 2012) of officers of WRD and NVDA, DPRs for construction of 15 medium and 85 minor irrigation schemes (for 129251 ha) were handed over (February 2012) to WRD.

Survey works for projects (2.677 MAF for 710000 ha) in the remaining portion of the Narmada basin (Amarkantak to Handia gauge) was not awarded as of August 2012. NVDA proposed to execute 50 per cent of the MMI projects through registered societies under its supervision after finalisation of DPRs, and the rest through WRD.

NVDA, for planning and execution of medium and minor projects, constituted Narmada Basin Projects Company Limited (NBPCL) in October 2011 with the objective of:

- promoting and operating the schemes for irrigation, water supply and drainage,
- acting as a nodal agency of the State Government for development of irrigation, power and allied projects,
- identifying probable projects for development and
- raising funds necessary for development of irrigation, power and allied projects etc.

So far (August 2012), execution of remaining medium and minor projects could not be started either by NVDA, NBPCL or WRD.

As per the Report (May 2009) of the Task Force on Irrigation, Planning Commission, Government of India, five to 10 years are required for completion of medium projects. Therefore, all the activities such as, survey and investigation, preparation of DPRs, various clearances, acquisition of land, resettlement of project affected families and fixation of agencies should be completed before 2019 to complete the projects before the review year 2024. After identification of projects, a minimum of 27 months are required for environment clearance alone which is an external factor on which NVDA does not have control and two years for other activities.

Considering the minimum actual time of three years in environment clearance and 12 years in other activities including construction, it may be difficult to complete the remaining 266 medium projects<sup>21</sup> by the review year unless all the medium projects are identified by 2014, clearances are obtained in minimum time, funds required for the projects are tied up and other activities are meticulously planned and executed within the minimum prescribed time. The mandate for execution of medium and minor projects needs to be made clear for ensuring completion of the works before 2024.

As per the Report (August 2001) of the Working Group on Minor Irrigation, Ministry of Water Resources, Government of India, minor projects generally take three to seven years time in total implementation. Therefore, implementation of minor projects before the review year is possible if project-wise plans are prepared, agencies are tied up for execution and funds for the projects are made available.

The Member (Engineering) stated (October 2012) that 135 medium and 3000 minor projects were to be completed by the WRD against which only 19 medium and 1134 minor projects could be completed. He further explained that absence of arrangement for timely identification of schemes and detailed survey of the basin were the reasons for not taking up these projects and that it had decided to complete survey through basin-wise satellite imageries and identify the projects for preparation of DPR and detailed estimates.

In the exit conference NVDA stated (December 2012) that NBPCCL had undertaken the survey work, which was in progress. NVDA further stated that arranging finance for execution of these projects was a major area of concern.

The replies do not give details of plan to complete the medium and minor projects before the review year.

### **3.9 Status of utilisation of water**

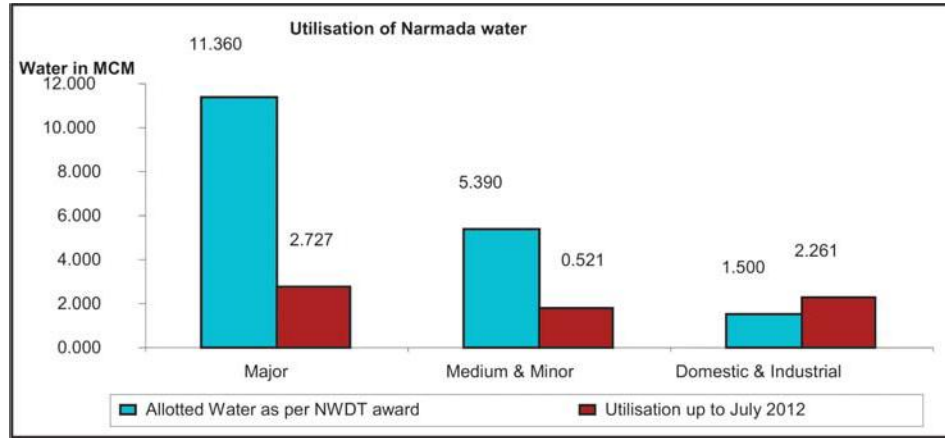
According to the award, utilisation of water in a water year<sup>22</sup> through every major and medium project by each party State shall be figured out on the basis of actual daily discharge at canal head. Water account of reservoirs shall be

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<sup>21</sup> Total medium projects: 300 minus 34 (19 completed and 15 identified).

<sup>22</sup> Water year: This is meant for counting of water utilisation from July to June of every year.

kept by 10 daily periods<sup>23</sup>. Status of utilisation of water through major, medium and minor projects up to July 2012 against the planned utilisation of water as per NWDT award is given in the graph below:



(Source: - Information provided by NVDA)

### 3.9.1 Shortfall in utilisation of water

**Total utilisation of water was only 5.51 MAF against allocated 18.25 MAF after lapse of 33 years of time.**

Overall status of water utilisation through major, medium and minor irrigation projects including domestic and industrial use of water in the last five years up to 2011-12 is shown in the table below;

Table No: 3.6

(Water in MCM)

Particulars of utilisation	Water Years				
	2007-08	2008-09	2009-10	2010-11	2011-12
Allocated Water according to NWDT award	24797.82	15369.54	17467.53	17776.49	28070.00
Actual utilisation through Major Projects	3018.44	2335	2581.86	3171.77	3363.30
Utilisation through Medium Projects	239.15	194.65	193.87	252.86	237.10
Utilisation through Minor Projects	280.76	189.02	293.87	406.06	3195.00
Utilisation through Domestic, Industrial use and Pumping schemes	1251.1	2949.55	2579.98	2838.43	
<b>Total utilisation of water (in MCM)</b>	<b>4789.45</b>	<b>5668.22</b>	<b>5649.58</b>	<b>6669.12</b>	<b>6795.40</b>
<b>Total utilisation of water (in MAF)</b>	<b>3.88</b>	<b>4.60</b>	<b>4.58</b>	<b>5.41</b>	<b>5.51</b>
<b>Total utilisation in per cent with reference to allocated water as per actual availability of water</b>	<b>19.31</b>	<b>36.88</b>	<b>32.34</b>	<b>37.52</b>	<b>24.21</b>
<b>Total utilisation in per cent with reference to allocated water of 18.25 MAF as per award</b>	<b>21.26</b>	<b>25.21</b>	<b>25.10</b>	<b>29.64</b>	<b>30.19</b>

(Source: - Information provided by NVDA)

As evident from the above, after lapse of more than 33 years from the date of award of the Tribunal, total utilisation of water was only 5.51 MAF representing 24.21 per cent of the total water allocated during the water year ending June 2012.

We noticed that:

<sup>23</sup>

It is an account which shows water utilisation during a period of 10 days (In a month, utilisation is measured for the dates 1-10, 11-20 and 21 to last date of the month).

- Total water utilisation of Narmada water through major projects (WRD: 1.858 MAF from five projects and NVDA: 0.868 MAF from four projects) was 2.726 MAF only during the water year 2011-12 against the created storage capacity of 9.11 MAF for utilisation in irrigation, which was far behind the planned utilisation of 11.05 MAF. The less utilisation of water despite creation of higher storage capacity was mainly due to non-completion of distribution network of canals.
- In case of two major projects namely RABLS and BDP, construction works of canals were taken up<sup>24</sup> after completion of construction of dam (1988). Construction of canal works in the three major projects, taken up during the years 1990 to 1992 could not be completed so far (March 2012) after lapse of 20 to 22 years from start of the works due to reasons such as delay in development of micro distribution network, contractors abandoning the works before completion and engaging contractors having poor bid capacity.
- In case of three major projects<sup>25</sup> where dams had been completed during 1988 to 2009, water could not be utilised at all due to non-completion of canals system mainly due to slow progress by the contractors and partially due to delay in acquisition of land.
- The total planned utilisation of 11.05 MAF water through major projects also included utilisation of additional water of 0.096 MAF. No plan has, however, been prepared to create capacity for utilisation of the said additional water as of August 2012.

**3.9.2 Absence of plan after decrease in proposed utilisation of water**

NVDA changed (March 2012) the planned water use in major projects (vide **Appendix 3.10**) assigning reasons such as, change of three<sup>26</sup> power projects into multipurpose projects, non-diversion of water in to Mahanadi basin and execution of Punasa LIS instead of Chhota Tawa project, as under;

**Table No: 3.7**

1.	Increase in projected use of water from the reservoirs (four completed by WRD and four ongoing under NVDA)	8 Projects	0.867 MAF
2.	Decrease in utilisation of water (three completed and six ongoing)	9 Projects	0.707 MAF
3.	Decrease in utilisation of water (Forthcoming projects)	6 Projects <sup>27</sup>	0.627 MAF
<b>Total decrease</b>			<b>1.334 MAF</b>

(Source: - Information provided by NVDA)

No plan was made either for proposed increase in water utilisation or for compensating decrease in utilisation of water.

<sup>24</sup> RABLS: 1992 , BDP: 1990.

<sup>25</sup> BDP, OSP, Upper Beda.

<sup>26</sup> Raghopura- Rosra-Basania

<sup>27</sup> Dudhi: 127.030 MCM, SMS: 81.36 MCM, Morand Ganjal: 37.83, Chhota Tawa: 317.32 MCM, Chinki: 163.68 and RRB: 46.20 MCM= total 773.420 MCM.

Though increase in utilisation of 0.867 MAF water was envisaged, there was no plan for increasing utilisation of water either by increasing the command area or by increase in the storage capacity of dams. The proposed increase in utilisation of water may not be achievable in view of non-achievement of planned utilisation of water up to the water year 2011-12.

NVDA has also not prepared any plan so far (August 2012) to compensate the decrease in utilisation of 1.334 MAF (0.707 MAF + 0.627 MAF) water for 15 projects either by increasing capacity of existing projects or taking up new project.

- Construction of BDP project, which is right bank canal of RABLS dam, envisaged utilisation of 2.035 MAF water. Due to insufficient water in RABLS dam to cater to the requirement of BDP, a plan to feed water from reservoir of Ataria major project (0.091 MAF) to BDP was prepared (January 2009). According to the reverse calendar, the reservoir of Ataria was planned for completion by the year 2019-20 whereas BDP was planned to be completed by the year 2016-17. Subsequently, Ataria major project was converted (January 2009) into minor project due to reduction in command area at the time of detailed survey to utilise only 0.017 MAF water. Thus, the requirement of water for BDP would not be met and might impact the actual drawal of water awarded by NWDT.

Thus, on the one hand there was no plan to make up the decrease in utilisation (1.334 MAF) of water and use of additional water (0.096 MAF), on the other hand the proposed increase in utilisation of water (0.867 MAF) may not be achieved considering the utilisation of water up to 2011-12.

Looking to the slow pace of work of completion of canals system, utilisation of less water than the created potential and unrealistic change in proposed utilisation, it may therefore not be possible for the State to utilise the allocated water by the review year unless factors contributing to delay in completion of the works are effectively tackled.

The Member (Engineering) stated (October 2012) that the utilisation of water to full extent could not be achieved as canal work was time consuming and land acquisition work was spread over more than 2000 villages. In the exit conference NVDA stated (December 2012) that utilisation of water through Omkareshwar Project was affected due to hindrances by activists of Narmada Bacho Andolan (NBA). Regarding increase in utilisation of water in Tawa project, it was explained that it would be achieved by linking it with Morand-Gunjaj Project. In case of Bargi Diversion Project, it was stated that full utilisation of water would be achieved after completion of tunnel within four to five years and construction of up stream reservoirs.

The reply gives details of proposed utilisation of 0.658 MAF water only in respect of three major projects and not about NVDA's plan to complete projects so as to utilise the entire allocated water by the review year.

**3.10 Constraints in funding for the projects**

Funds of ₹ 11001.60 crore required to complete remaining projects could not be tied up.

The projects of NVDA are financed through Accelerated Irrigation Benefit Programme (AIBP), National Bank for Rural and Agricultural Development (NABARD) and State funds. NVDA incurred total expenditure of ₹10371.88 crore up to 2006-07. Details of the last five years allotment and expenditure are given in the table below:

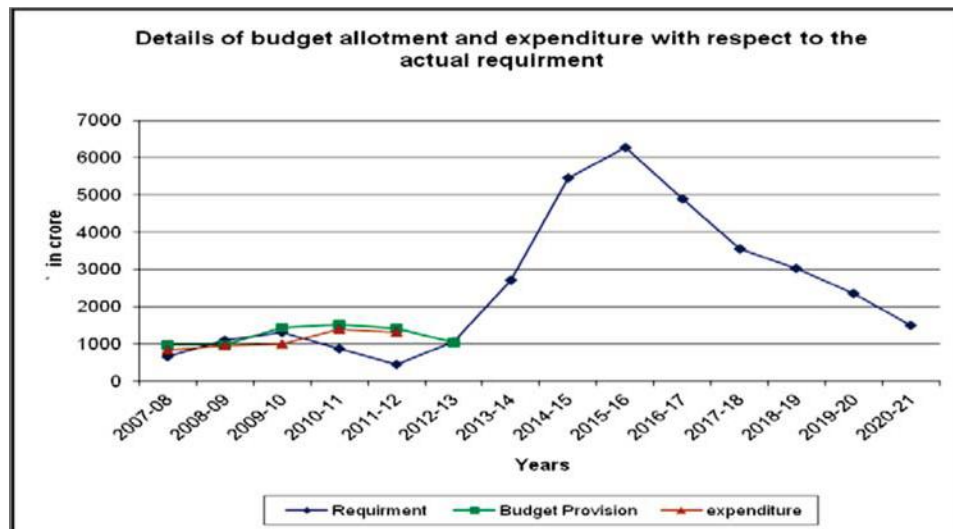
Table: 3.8

Year	Budget provision (₹ in crore)	Total expenditure (₹ in crore)	Savings (Percentage)
2007-08	965.43	835.44	129.99 (13.46)
2008-09	981.34	946.46	34.88 (3.55)
2009-10	1127.79	1003.35	124.44 (11.03)
2010-11	1526.83	1384.57	142.26 (9.32)
2011-12	1413.49	1302.58	110.91 (7.85)
<b>Total</b>	<b>6014.88</b>	<b>5472.40</b>	<b>542.48</b>

Source: Information provided by NVDA

As would be seen from the table, budget provision could not be fully utilised during the last five years up to 2011-12. Total savings of ₹ 542.48 crore during the last five years were mainly due to delay in approval of detailed project reports from Central Water Commission (CWC), delay in getting clearance from Ministry of Environment and Forest (MOEF), delay in fixing of agencies and slow progress of works by contractors, etc.

According to Vision 2012 (prepared in December 2003), NVDA planned to complete all major projects by 2012. NVDA assessed total requirement of ₹ 7068.28 crore for execution of major projects from 2007-08 to 2011-12. NVDA could however, spend only ₹ 5472.40 crore against allotment of ₹ 6314.88 crore during this period. Consequently, the projects remained incomplete and there was increased requirement of funds to complete the remaining projects during the period up to 2024. NVDA assessed (2012) total requirement of ₹ 30760 crore as mentioned in Appendix 3.11 to complete the remaining projects (major, medium and minor) by 2020-21. Requirement of funds for the years 2007-08 to 2020-2021, allotment and actual expenditure for the years 2007-08 to 2011-12 are depicted in the graph below:



Source: Information provided by NVDA



The State Planning Commission imposed (March 2012) a ceiling of ₹ 9351.40 crore against projected requirement of ₹ 20353 crore (**Appendix 3.11**) for the 12<sup>th</sup> Five Year plan (2012-2017). After imposition of the ceiling, NVDA has not planned to tie up funds for bridging the gap of ₹ 11001.60 crore.

We further noticed that:

- The requirement of ₹ 30760 crore assessed for completing remaining projects during the period up to 2020-21, was based on current schedule of rates (Year: 2009). Considering the inflationary tendency of developing economies, an assessment of additional fund and plan to meet escalation in cost during the entire period up to which project construction would continue was to be made. Though lumpsum escalation provision of 10 *per cent* for projects due for completion till 2016-17 has been made, we noticed that the provisioning did not consider the inflationary trends after 2009 schedule of rates based on which estimates had been prepared. We noticed that requirement of funds in eight projects will not be sufficient considering their completion period one year to five years (**Appendix 3.11**). Besides, in case of RABLS project having requirement of ₹ 694.30 crore for completion by 2015-16, no provision for escalation was made in the projections. These may cause serious resource constraints during coming years which may affect timely completion of projects.
- NVDA has never been able to utilise the allotted fund during the last 21 years as shown in **Appendix 3.12**. During the remaining period of the plan for completion of remaining projects (that is up to 2021), annual requirement of funds will range from ₹ 1495 crore to ₹ 6261 crore. The details are shown in **Appendix 3.10**. As the quantum of projects/works and funds that may have to be handled would increase substantially, NVDA has to take necessary measures to overcome inadequacies in planning, scheduling and monitoring of works for projects and consequent delays in completion of works so as to ensure completion of projects as envisaged in Vision 2020.
- The NBPCL formed in October 2011 has not come into operation so far (August 2012) for want of adequate manpower deployment in the Company. Consequently, process for raising funds for development of irrigation, power and allied projects etc. could also not be initiated through NBPCL as of August 2012.

The Member (Engineering) stated (October 2012) that the budget could not be utilised in 2005-06 and 2006-07 as there were delays in processing of tenders. He further stated that the extent of utilisation of funds provided had improved after 2006-07. In the exit conference NVDA stated (December 2012) that 13<sup>th</sup> plan document envisaged that no new projects would be taken up under Accelerated Irrigation Benefit Programme as sufficient large dams for storage had been constructed and therefore NVDA anticipated problem in funding for balance projects. It was further stated that the authority even now had resource constraint to implement all the projects and feasibility of market borrowing and other funding options through NBPCL was being explored to ensure timely availability of funds for the projects.



The reply is not acceptable as the department continued to surrender funds ranging from ₹ 34.88 crore to ₹ 124.44 crore during the period 2007-08 to 2011-12 and it would have to gear up for complete utilisation of the allotted funds by closely monitoring the works under execution.

Thus, funding arrangement for the projects remaining to be executed continues to remain a threat in timely execution of the projects for utilisation of allocated share of 18.25 MAF water before the review year.

### **3.11 Monitoring**

Monitoring and evaluation are essential components of project execution that aid completion of projects in a time bound manner with appropriate quality and economy.

#### **3.11.1 Ineffective monitoring of works by apex level office**

The Vision 2012 document envisaged establishment of monitoring cells under each of the members of NVDA for weekly monitoring and computerisation at Headquarters as well as in the field formations for quick transmission of information on the progress of the projects.

We noticed that:

- The Vision 2012 envisaged time event network analysis system in which various events in a project can be identified within the planned time for each event and are placed in network showing relationship of each event to the other event. The system would enable the department to identify and reduce the risks in various event of the project and provide a guidance frame work to develop and implement measures necessary for proper execution of the projects. This system has not been put in place so far (August 2012). As a result, mechanism for assessment of risks which arose during implementation of projects and solutions to address such risks, was not available at the apex level office to avoid delay in implementation of projects.
- Monitoring cell was not established as envisaged and there was no system of regular submission of periodical progress report of works to respective members at headquarters of NVDA. Progress reports of works were being submitted by the field formations as and when demanded by the apex office. As such, execution of works was not being monitored on regular basis at apex level. In the absence of a system of regular monitoring, apex level officers will not be able to identify the problems in execution of works in time and take remedial action. The weakness in monitoring system may lead to delay in completion of remaining works.

Although NVDA has installed computers at field formations and headquarters, an effective on-line management information system has not been developed so far (August 2012) to monitor progress of works.

In the exit conference NVDA stated (December 2012) that there was a mechanism for monitoring through reports prescribed from field and monthly/

**Monitoring cells at headquarters of NVDA was not in place.**

bimonthly meetings were taken by CE and at NVDA headquarters for monitoring.

The reply is not acceptable as the reports were not being obtained on regular basis and in the absence regular returns with up to date information, objectives of the meetings would not be achieved.

**3.11.2 Non-adoption of Programme Evaluation and Review Techniques (PERT) and Critical Path Method (CPM) for effective monitoring and evaluation**

**PERT and CPM were not being applied in execution of the projects.**

In the case of turnkey contracts being entered in to for the remaining projects/ remaining works of ongoing projects, a bar chart showing start date, completion date and duration of completion was being submitted by contractors as a programme for execution of works. In case of delays, contractors were being allowed to submit revised construction programme according to the delays.

As bar chart is a linear representation of construction activities, it does not indicate the activities that are critical and those which could be undertaken simultaneously to complete the project in shortest possible time. As a result, it does not indicate the effect of slippage in any activity from original time schedule. The monitoring of the projects through Programme Evaluation and Review Techniques<sup>28</sup> (PERT) and Critical Path Method<sup>29</sup> (CPM) provide a solution to this.

We noticed that PERT and CPM was not being applied in NVDA to identify critical activities of a project so as to ensure close monitoring in respect of such activities and avoid overall delays.

In the absence of monitoring cells at headquarters of NVDA, regular system of submission of progress report of works, on-line management information system and non-application of PERT and CPM for monitoring, evaluation and alternative plans, management may not be in position to assess the impact of delays in order to take corrective steps during the course of execution so as to complete the projects before 2024.

The Member (Engineering) stated (October 2012) that all the projects were being monitored using management information system (MIS) which is an advance version of CPM-PERT and was essential to all turnkey contracts. He further stated that the consultants independently completed MIS and submitted to NVDA for monitoring of contracts. In the exit conference (December 2012) NVDA stated that CPM/PERT charts were prepared in NVDA but in case of slippage of one activity like land acquisition and rehabilitation and resettlement due to agitation and litigation, the purpose of whole chart was defeated.

<sup>28</sup> This is a time event network analysis system in which various events in a project are identified with the planned time for each and are placed in a network showing relationships of each event to other event

<sup>29</sup> The method which calculates the longest path of planned activities to the end of the project, and the earliest and latest that each activity can start and finish without making the project longer

The reply is not convincing as monitoring cell did not exist at headquarters of NVDA. Regular system of submission of progress report of works to headquarters of NVDA and use of CPM/PERT were also not noticed in Audit.

### **3.12 Conclusion**

NVDA incurred expenditure of ₹ 5472.40 crore against allotment of ₹ 6014.88 crore for creation of infrastructure to utilise Narmada water during 2007-12. There were delays in approval of DPRs from CWC, obtaining environment clearances and award of work. There were further slippages in execution of dams as well as canals.

Out of the 23 major projects, seven projects have been completed for utilisation of 3.157 MAF water, seven projects were ongoing and nine projects were yet to taken up. Further, out of 26 dams of these 23 projects, 11 dams (storage capacity of 9.114 MAF) for 13 projects were already completed, work of one dam was in progress and works for 14 dams were yet to be started.

Survey and investigation work for all the remaining medium and minor projects for utilisation of 3.764 MAF water was still not complete as such projects are not identified in most cases. Ineffective monitoring, non-preparation of alternative plans and award of works to ineligible contractors resulted in delays in construction. As a result, NVDA could increase the utilisation of water by only 1.63 MAF during 2007-12. Assessment of requirement of fund for completion of the remaining projects was also inadequate. Process for raising funds for development of irrigation, power and allied projects etc. could not be initiated through Narmada Basin Projects Company Limited so far.

NVDA may be able to complete construction of remaining dams and canal works of major projects by the review year only if works are awarded and taken up immediately and execution of works is monitored meticulously. Further, remaining medium projects may be completed by the review year if all the medium projects are identified immediately, clearances are obtained in minimum time, funds required for the projects are tied up and other activities are meticulously planned, monitored and executed.

Audit analysis revealed that preparedness for tapping and utilisation of Narmada water as per NWDT award is tardy as present progress was not found satisfactory. Effective action would be required to achieve the targets, else Madhya Pradesh will be lagging behind in getting its due share of Narmada water.

### **3.13 Recommendations**

The Government, in order to utilise the allocated share of water by the review year, may consider to;

- prepare a realistic reverse calendar by considering internal as well as extraneous factors for appropriate planning of works.

- establish a system of identification of risks involved and develop a mechanism for planning to address such risks to reduce delay in execution of works by effective monitoring.
- examine reasons for delay in environment and forest clearances and develop a mechanism to reduce delay in obtaining clearances.
- strengthen mechanism for evaluation of bids to ensure engagement of competent contractors.
- adopt Programme Evaluation and Review Techniques and Critical Path Method to ensure synchronised construction of dams and canals.
- make realistic assessment of requirements of funds and take steps for ensuring timely availability of funds.
- identify medium projects immediately to take up implementation of those projects.