

Chief Engineer, (Water Resources) Nagpur

सरळ सेवा भरतीने सहाय्यक कार्यकारी अभियंता या पदावर नियुक्ती दिलेल्या अधिकाऱ्यांसाठी क्षेत्रीय
प्रशिक्षण कार्यक्रम, जलसंपदा विभाग
Field Training for Direct Recruits as Assistant Executive Engineer of Water
Resource Department.

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“क्षेत्रीय प्रशिक्षण अहवाल” “FIELD TRAINING REPORT”

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Maharashtra Engineering Training Academy, Nashik

Executive Summary

Maharashtra Engineering Training Academy (META), Nashik organized training program for direct recruits - Assistant Executive Engineer of Water Resource Department (WRD), in accordance with Maharashtra Engineering Service Examination-2004.

As per schedule of training program, we were directed to undergo training at Chief Engineer (Water Resources), Nagpur from 11th to 16th February 2008.

We joined Chief Engineer office on 11th February 2008 and contacted to Shri. K.E. Varambhe Saheb, Asst. Chief Engineer and he shared valuable information with us. He explained about the organizational setup of the Chief Engineer office and briefly introduced various issues related to the construction and management work of irrigation works. He framed a systematic schedule for the one week training and included various aspects related to the training. We have undergone the training as per schedule and at the end, I am very much satisfied with the quantity and quality of the schedule.

On 11th February 2008, **Shri. M.I Shaikh Saheb**, Chief Engineer, interacted with us; personally I felt that it was the most enjoying part of the training, since he briefly explained each and every activity related to the Water Resources Department. He started with the deficiency of water and non availability of ideal sites for the water resources projects, so he stressed on effective and optimum utilization of the existing sites by using technical knowledge.

The geographical area of Maharashtra is 307 thousand km². Out of which only 225 lakh ha area is cultivable. The irrigable area from all available surface water is 126 lakh ha and out of which possible irrigable area due to geographical constraints and storage of water is only 85 lakh ha. Till July 2006, 41.32 lakh ha area is brought under irrigation using surface water through 54 major, 222 medium and 2726 minor irrigation projects of Water Resources Department. About 12.98 lakh ha area is irrigated by Local sector through minor irrigation projects. 74 major, 180 medium and 992 minor projects are under construction stage and they can irrigate 32.70 lakh ha th

Government of Maharashtra is trying to irrigate 85 lakh ha area through these projects.

As per directions of the Chief Engineer, we decided to study various issues such as-Water Use efficiency, State Water Policy, Maharashtra Water Resources Regulatory Authority (MWRRA), Maharashtra Water Resources Management by Farmers, Benchmarking or Irrigation Projects, Water Audit, Irrigation Backlog, Maharashtra Water Sector Improvement Project (MWSIP), Water Users' Association (WUA), Forest Act, Land Acquisition and Rehabilitation, Budgeting etc.

He also suggested interacting with officers and as per his directions; we completed the given study as well as learn several other things.

This report includes the brief of all these studies performed and understand by me. It was very nice experience to get in depth knowledge through systematic schedule.

Acknowledgement

I take this opportunity to express my gratitude to those whose active help and support make this report possible in the present form.

First of all, I express my sincere gratitude to **Er M.I Shaikh Saheb**, Chief Engineer (Water Resources), Nagpur for insisting in me the drive to work hard and for inculcating in me the discipline to think clearly. He shared his valuable experiences with us and it was the most enjoyable part of training

It is the endless guidance and constant encouragement of Er. Doiphode Saheb and Er. K.E. Varambhe saheb, Asst. Chief Engineer, Nagpur and I would like to express my heartfelt gratitude to them and staff for providing us necessary technical.

My special thanks to Executive Engineer- Shri. Waghmare saheb, SDE- Shri. M.N. Ranganekar saheb, Shri Jog saheb, Shri. Kulkarni saheb, Shri. Bahirat saheb, Shri. Dhok saheb, Shri Vaidya Saheb (Chandrapur), Shri. Agarkhedkar saheb and Shri. Chitale saheb, Shri. A.D. Dikshit saheb, Shri. Rengudwar saheb, Shri. Ambhorkar saheb, Shri. Sonak saheb, Shri. Nagdeve saheb, Shri. Alone saheb for their active help and valuable guidance throughout the training.

Definitely the knowledge, I received during this training session was a lifetime experience and it will serve as a foundation for my career.

Last, but not least, I wish to express my gratitude towards my parents- Shivaji and Rohini, my grandparents- Rangnath and Sitabai, my uncle Raosaheb and aunty Radhika who sacrificed a lot to give me a good education.

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(Assistant Executive Engineer)

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Chapter 1 Introduction

1.1 Program Schedule

Date and Time	Training Subject	Officer
11/02/2008 (10:00)	1. Arrival Report at Chief Engineer office 2. Interaction with Asst. Chief Engineer	Shri. K.E. Varambhe saheb, Asst. Chief Engineer
11/02/2008 (14:00)	3. Guidance by Chief Engineer.	Shri. M.I. Shaikh saheb, Chief Engineer
12/02/2008 (10:00)	4. Notes preparation 5. Meetings with secretary 6. PM Package 7. Computer Centre	Shri. M.N. Ranganekar saheb, Sub-Divisional Engineer
12/02/2008 (14:00)	8. Administrative Approval 9. Technical Sanction 10. Canal Design 11. Design by Central Design Organization	Shri. Jog saheb, Sub-Divisional Engineer and Shri. Dikshit saheb
13/02/2008	12. Field Visit: Asolamendha Project/Naleshwar Project, Chandrapur	Shri. Mahajan Saheb and Shri. Vaidya Saheb
14/02/2008	13. Project Management 14. Maharashtra Water Sector Improvement Project 15. Benchmarking of Irrigation Project 16. Water Audit 17. Recovery 18. Water User's Association Registration 19. State Water Policy 20. Maharashtra Water Resources Regulatory Authority	Shri. Kulkarni saheb and Shri. Bahirat saheb, Sub-Divisional Engineer
15/02/2008 (10:00)	21. Scrutiny of proposals for financing under NABARD loan scheme	Shri. Waghmare, Executive Engineer Shri. Dhok, Sub-Divisional Engineer Shri. Rengurwar, Assistant Engineer II
15/02/2008 (14:30)	22. Forest Proposals 23. Land acquisition proposals. 24. Rehabilitation 25. Flood control 26. Dam Safety Inspection 27. Gate Operation Schedule	Shri. Aambhorekar saheb, Sectional Engineer, Shri. Alone saheb
16/02/2008 (10:00)	28. Establishment 29. Service Book 30. Salary Slip 31. Leave 32. Confidential Report	Shri. Sonak saheb,
16/02/2008 (14:30)	33. Audit Para 34. Store 35. Vigilance	Shri. Aagarkhedkar saheb, Sub-Divisional Engineer, Shri Sonak saheb

1.2 Guidance by Chief Engineer:

On 11th February 2008, we joined Chief Engineer (Water Resources) Nagpur office for one week training session and contacted and interacted with Assit. Chief Engineer.

During afternoon session, Chief Engineer- Shri. M.I. Shaikh saheb shared his valuable experience with us and guided on following aspects of the Water Resources Department.

- Deficiency of Water
- Water Use efficiency
- State Water Policy
- Maharashtra Water Resources Regulatory Authority (MWRRA)
- Maharashtra Water Resources Management by Farmers
- Benchmarking or Irrigation Projects
- Water Audit
- Irrigation Backlog
- Maharashtra Water Sector Improvement Project (MWSIP)
- Water Users' Association (WUA)
- Forest Act
- Land Acquisition
- Rehabilitation
- Budgeting

1.3 Classification of Irrigation Projects

Classification of irrigation projects is based on cultivable command area of the project. The classification is as shown below.

Type of Project	CCA (ha)
Minor Irrigation Projects (Local Sector) with the District Council. (ZP)	Below 100
Minor Irrigation Projects (Local Sector) with the Rural Development & Water Conservation Department.	101 to 250
Minor Irrigation Projects (State Sector) with the WRD	251 to 600
Large Minor Irrigation Projects (State Sector) with the Water Resources Department	601 to 2000
Medium Irrigation Projects (State Sector) with the WRD	2001 to 10000
Major Irrigation Projects (State Sector) with the WRD	Above 10000

1.4 Maharashtra Management of Irrigation Systems by Farmers Act-2003

The National Water Policy (2002) lays down that efforts should be made to involve farmers, progressively, in the various aspects of Management systems. The Commission (1995) has also recommended that statutory provisions may be made for Management of Irrigation systems by providing water from public canal systems to Water Users' Associations (WUAs) on volumetric basis. In order to bridge the gap between irrigation potential created and its actual utilisation and also to optimise the benefits from proper use of surface and ground water through an increased efficiency in distribution, delivery, application and removal of excess water, the State Government has taken a policy decision to provide a legal recognition to the contribution and operation of Water Users Associations. Accordingly, the Maharashtra Management of Irrigation Systems by Farmers Act -2003 has

been prepared and approved by the State cabinet . The bill of this act has been placed before the State Legislature for approval.

1.5 State Water Policy

As per the recommendation laid down in the National Water Policy and Maharashtra Water and Irrigation Commission Report, the State water policy has been framed by Maharashtra State in July 2003. The objective of the Maharashtra State water policy is to ensure the sustainable development and optimal use and management of the State's water resources to provide the greatest economic and social benefit for the people of the State of Maharashtra in a such manner that maintains important ecological values within the rivers and adjoining lands. The policy has innovative features such as water audit, benchmarking of water resources projects, water entitlement etc.

1.6 Impacts of Reforms in Water Sector

The State Government has initiated several policies and administrative reforms for development in Water Sector. Due to above reform initiatives, irrigation efficiency has been increased from 101 ha./Mm³ to 117 ha./Mm³ and revenue in the last three year has been substantially increased. As a result of this, Government of Maharashtra has become first State in the country to met out 100% O&M expenses from water charges only. A beginning in performance improvement in irrigation sector will go long way in making water sector of the State self sufficient and sustainable one in years to come. The international commission on irrigation and drainage (ICID) has taken the cognizance of the reforms/ initiatives in water resources sector and awarded "Watsave Award 2004" to Shri S.V.Sodal, Secretary (CAD), Irrigation Department, Maharashtra.

Chapter 2 Irrigation in Maharashtra

2.1 About Maharashtra State

Maharashtra occupies main portion of the Indian Sub-continent. The geographical location of Maharashtra is bounded between latitude 16.4o to 22.1o N and longitude 72.6o to 80.9o E and has an area of 307.71 thousand sq km, which is about 9.4 percent of the total geographical area of India. Maharashtra stands first amongst the major states in India in income & growth rate. The State has 720 km long coastline along Arabian Sea. The western hill ranges are almost parallel to this coastline. The State is divided into two physiographic regions of Konkan and rest of the State (Deccan Plateau). The Deccan Plateau spread over on the east side of ghat has west-east slope. In general, the altitude of the plateau varies between 300 to 600 m. Maharashtra has Gujarat on north-west, Madhya Pradesh in north, Chhattisgarh on east and Andhra Pradesh, Karnataka and Goa in south.

2.2 Physiography

The State is divided into five major regions physiographically-

1. Konkan strip on western side
2. Sahyadri ranges
3. Plateau on eastern side
4. Hilly ranges of Satpuda and adjacent area on north and
5. Hilly and forest region of north-south Wainganga basin on East side of State.

1. Konkan Strip

The narrow strip of land extending from Damanganga basin in north to the border of Goa State in south is the Konkan. It has Sahyadri ranges on east and Arabian Sea on west. The Konkan strip is about 53 to 60 km wide and 500 km long along north-south. The widest stretch is about 100 km. Width decreases as one proceeds towards south. The region becomes hilly and altitude increases from the depressed coastline towards east.

2. **Sahyadri Ranges** These continuous mountain ranges extend almost parallel to the western coastline. It is known as Western Ghat. The average height of Sahyadri in Maharashtra is 900 m. It is more in the north and diminishes towards south.

3. **Eastern Plateau Region (Deccan Plateau)** The height of this plateau goes on diminishing from 600 m on western side to 300 m in the Wainganga basin on east. This region is formed from lava of igneous rocks. All the districts of Khandesh¹, Marathwada², Western Maharashtra and the western districts of Vidarbha³ fall in this region.

¹ Khandesh includes Dhule, Nandurbar & Jalgaon districts

² Marathwada includes Aurangabad, Jalna, Parbhani, Nanded, Osmanabad, Latur, Hingoli & Beed districts

³ Vidarbha includes Akola, Washim, Amravati, Yeotmal, Wardha, Nagpur, Bhandara, Gondia, Chandrapur, Buldhana & Gadchiroli districts.

4. Satpuda Ranges and Tapi- Purna basin on North

Satpuda hill ranges lie on the northern boundary of the State. This region is spread over in the districts of Amravati, Akola, Jalgaon and Dhule.

5. Eastern Region Consisting of Wainganga basin

Eastern region comprises of eastern side of the State and flat paddy field region lies along both the banks of the river at an elevation of about 300 m. On the eastern side of this flat region along the Maharashtra - Chhattisgarh boundary are the hills of different geological formations other than the Deccan Trap. Many eastern tributaries of Waingangā originate from this hill range. The height of this hilly plateau is around 800 m.

2.3 Irrigation Development during Post-independence Period

Maharashtra State as of today came into existence in 1960. The increasing population was facing shortage of food grains. This has led to the need of increasing agricultural production. By giving priority to agricultural development, attempt has been made to achieve irrigation development in a planned manner. Hardly, 0.274 MHa, irrigation potential was created in the State during preplan period i.e. before 1950. Agriculture has been the prominent occupation to provide food and fiber to the growing population of the State. Adequate, timely and guaranteed water supply is of paramount importance in agriculture production and irrigation development plays a key role in alleviating rural poverty. The State has created 3.913 MHa irrigation potential using surface water resources by 2004 through 53 major, 312 medium and 2457 state sectors minor irrigation projects Besides 55 major, 121 medium, 852 State Sector minor projects and 48 lift irrigation projects are under construction in the State. The total investment in the irrigation sector up to 1 April 2004 is around Rs. 337.50 billion. The ultimate irrigation potential, through surface water and ground water resources, has been estimated as 12.6 MHa.

2.4 Crops Irrigated

The crops grown vary significantly between projects. The main crops grown in project command are sorghum, wheat, gram, sunflower, maize, L. S. cotton, vegetables, groundnut, sugarcane, banana, paddy etc.

2.5 Management of Systems

The irrigation systems are constructed and mostly managed by government. Operation and maintenance of irrigation projects is looked after by irrigation divisions, which are administratively controlled by circle office. GOM has taken policy decision to supply water for irrigation through Water Users' Associations only. Accordingly the Act is passed by the Government. Water Users' Associations are formed in command areas of irrigation projects and irrigation management of area under their jurisdiction is transferred to them. Recently, a major project Waghad in North Maharashtra region is handed over to Federation of WUAs for management.

2.6 Present Status of Irrigation Utilization

In spite of various measures taken so far, there is a gap between potential created and utilized. The overall reasons for less utilization are as follows-

- i) Low water yield in the reservoirs
- ii) Diversion of irrigation water to nonirrigation uses
- iii) Tendency of farmers to grow cash crops which are highly water intensive like sugarcane
- iv) Thin & scattered irrigation resulting in low efficiency
- v) Low utilization during Kharif (Rainy) season
- vi) Reduction in storage capacity due to silting
- vii) Poor/approximate assessment of the irrigated area in the command
- viii) Non accounting of irrigated area outside the command (influence area)
- ix) Poor maintenance of the infrastructure due to financial constraints
- x) Non participation of beneficiaries

2.7 Participation of Beneficiaries in Water Resources Management

National Water Policy 2002 and Maharashtra State Water Policy advocate participatory irrigation management. In view of these, water users associations were setup in command areas of various projects in different parts of the State. By the end of 2004-05 in all 774 WUAs were in full operation with operational area of 2.51 lakh ha. Besides this the number of WUAs which have been registered and entered into agreement during 2004-05 was 956 covering an area of about 4.33 lakh ha. Looking at the slow pace of PIM in last decade and to bridge the gap between irrigation potential created and its actual utilization and to optimize the benefits by ensuring proper use of surface & ground water by increased efficiency in distribution, delivery, application and drainage of irrigation systems and for achieving this objective, to give statutory recognition to the constitution & operation of WUAs, an act has been passed by the State legislature. The act is known as "Maharashtra Management of Irrigation Systems by Farmers Act, 2005". As per this act, all the beneficiaries in the command of a distributary / minor will become the members of WUA, once the area is notified under the act.

2.8 Present Organizational Set up

The organizational set up for irrigation management comprises of section office at the lowest level looking for an area of about 3000 to 4000 ha. The section office is headed by a sectional officer having staff for O & M of the area. The subdivision dealing with four to five sections is headed by sub divisional officer/engineer and works under the control of division. Thus the division is looking after four to five subdivisions with sixteen to twenty five sections and headed by the Executive Engineer in charge of the irrigation projects. The management circle headed by the Superintending Engineer controls three to four divisions. The regional head of the Superintending Engineers (four to five circles) is either Chief Engineer or the Chief Administrator in case of CAD projects. The Superintending Engineers in-charge of irrigation circles are responsible for full utilization of the water stored in reservoir and maintenance of public utilization system, as well as recovery of water charges through their subordinate offices.

Chapter 3. Benchmarking of Irrigation Projects

3.1 What is Benchmarking

Benchmarking can be defined as a systematic process for securing continual improvement through comparison with relevant and achievable internal or external norms and standards.

The exercise was conducted for 6 major projects in 2001-02. The number of projects covered during 2002-03 was 254 and instead of presenting data of all these projects individually, irrigation circle was considered as unit for evaluation of performance. Here also it was observed that some of the characteristics of projects under a circle are not identical and to make the comparison still on better grounds, projects under a circle in a sub basin are grouped together & comparison is made with other projects in a particular plan group.

3.2 Indicators for Benchmarking

System Performance

1. Annual Irrigation Water Supply Per Unit Irrigated Area
2. Potential Created And Utilized

Agricultural Productivity

3. Output (Agricultural Production) Per Unit Irrigated Area
4. 4 Output (Agricultural Production) Per Unit Irrigation Water Supply

Financial Aspects

5. Cost Recovery Ratio
6. Total O&M Cost Per Unit Area
7. Total O&M Cost Per Unit Volume Of Water Supplied
8. Revenue Per Unit Volume Of Water Supplied
9. Mandays For O&M Per Unit Area
10. Assessment Recovery Ratio
 - A. Irrigation
 - B. Non Irrigation

Environmental Aspects

11. Land Damage Index

Social Aspects

12. Equity Performance

3.3 Methodology for benchmarking

The following process was used in development of this report.

1. Irrigation projects are selected, representing the main geographical regions of State and of categories viz. major (CCA more than 10000 ha), medium (CCA more than 2000 ha and below 10000 ha) and minor (CCA less than 2000 ha).
2. For consistency in monitoring & evaluation, projects considered (same projects) for benchmarking during 2003-04 is continued this year also.
3. To exercise control over the management divisions, reshuffling of some projects is carried out during 2004-05. With this reshuffling, the number of management circles have been reduced from 25 to 21 (locations are shown in enclosed map). Therefore, the indicator wise values for 2003-04 of this report may not tally with those given in last year's report.

4. Projects under two circles JIPC Jalgaon & Gosikhurd Lift Irrigation circle, Bhandara are under construction and the distribution network is not completed, therefore, not considered for benchmarking.
5. Data is collected in spreadsheet and analyzed in MWIC office.
6. The data is correlated with water accounts (2004-05) of relevant projects.
7. The presentation for every indicator is done with past-past (5 year average), recent past (2003-04) and present year (2004-05) in order to compare the performance with predecessors as well as own performance of last year.
8. Reasons for deviation from last year's performance are called from each circle.

3.4 Irrigation Seasons

In Maharashtra, the Irrigation Year is reckoned from 1st July to 30th June next year. The seasons are as under:-

- a. Kharif Season .. 1st July to 14th October
- b. Rabi Season .. 15th October to 28th February of next year.
- c. Hot Weather Season .. 1st March to 30th June.

3.5 Preliminary Irrigation Programme (PIP)

Preliminary Irrigation Programme is prepared depending on the availability of water in the reservoir on 15th October excluding quantity for non-irrigation uses and other commitments such as sanctioned blocks, etc. The preliminary irrigation programme, therefore, has to be very realistic and based on the probable demands of the cultivators in the command. The planning has to be such that all the available water in the storages as on 15th of October is fully utilized by the end of the irrigation year. It is also customary to prepare a supplementary irrigation programme by January every year so as to account for the actual utilization of the water during the past 3 to 3 ½ months and to revise forecast of the utilization of the balance of water completely during ensuing hot weather season.

3.6 Present System of water management

Rotation wise records of water use are maintained and submitted to the division office in form No. 126 since 1931. Keeping an account of water used in each rotation and monitoring the services is still in vogue.

Presently, monitoring of supply system during rotation is done as follows.

1. Preliminary Irrigation Programme is prepared for every project & season wise use of water is planned.
2. Wireless communication system is installed in commands of major projects. Daily lake levels, rainfall, inflow, outflow, discharges in canals etc. are communicated on wireless system.
3. The management staff including sectional officer takes round the clock reviews of canal flows and discharges. The gates of distributaries are operated turn by turn and water loss is avoided by preventing over irrigation.
4. Unauthorized irrigation, if any, observed during rotation by officers and staff is noted and charged at penal rates.

5. How much area is irrigated in one unit of water is the basic question any officer will ask his subordinates during the rotation. Based on the values of Area Irrigated per Mcum of water performance of management is judged.
6. Surprise checking of command area is carried out by Sectional officers, Sub divisional Engineers and Executive Engineers.
7. Area irrigated is measured by the measurers, percentage cross checking of these measurements by Sectional officer, Sub-divisional Engineer and Executive Engineer helps in avoiding any area irrigated being left unassisted.
8. Completion Irrigation Report (CIR) is prepared at the end of an irrigation year. It includes-
 - a. season-wise water use for different purposes
 - b. transition and evaporation losses
 - c. Duty
 - d. Programmed and actual drawals
 - e. Crop wise area irrigated, etc.

The report is submitted to higher officers. The performance is checked with PIP and the differences, if any, and the reasons for the same are also noted.

Chapter 4 Water Audit

4.1 What is Water Auditing?

Water auditing is a systematic & scientific examination of water accounts of the projects. It is an intelligent & critical examination by independent organization. It is a critical review of system of accounting. Water auditing is checking sector wise water use against planning, water use efficiency in irrigation and losses. As far as irrigation sector is concerned, water audit should give comparison of planned water use efficiency (i.e. ha /Mcum) versus actual water use efficiency (i.e. ha/ Mcum). This will provide information about loss of water in the system. Efforts should be made to identify the causes for it and initiate action to minimize the losses to improve the water use efficiency.

Broadly water auditing involves checking the following parameters.

1. Actual water use in various sectors against planning,
2. Whether water use for irrigation in every season is as per planning & checking the water use efficiency (ha/Mcum)
3. Checking whether the prescribed procedure for irrigation management is followed or not.
4. Whether records as per requirements are maintained or not.

4.2 Necessity of Water Auditing

The water available from storage dams is normally used for drinking water, industrial use, irrigation etc. With growing population & scarcity of water, there is growing demand from all sectors. Irrigation sector uses 75 to 80% of water, therefore, any saving in water use in irrigation sector would make available more water for other uses or bring additional area under irrigation. The water resources projects are planned with certain water use efficiency (area irrigated in ha per Mcum).

But in reality planned water use efficiency could not be achieved for various reasons and tail-enders are deprived of getting full benefits of water resources project. Hence it is essential to improve the performance of projects by way of increasing the water use efficiency which will increase area under irrigation with same quantity of available water in the reservoirs.

4.3 Benefits of Water Audit

Benefits of water audit include improved knowledge and documentation of the distribution system including problem and risk areas. Water auditing will lead to

- a. efficient use of available water resources
- b. reduced water losses
- c. transparency in overall process
- d. increased accountability of field officers
- e. enhanced knowledge of the distribution system
- f. improved financial performance and
- g. Improved level of service to customers.

4.4 New Water Accounting Procedure

The irrigation facilities created through public funds are not utilized to the fullest extent. The reasons for low utilization can be listed as, more conveyance losses, poor field application methods, inadequate O & M, poor water accounting methods etc. Increase in demand of water for domestic and industrial use due to growth of urbanization and industrialization has resulted into lesser availability of water for irrigation. Hence water available for irrigation has to be used most judiciously & efficiently to achieve more irrigation and crop yield per unit of water.

In this context, Government of Maharashtra set up in September 2002, a committee under the chairmanship of Chief Engineer and Secretary, Maharashtra Water and Irrigation Commission, Aurangabad. The committee after having detailed study of prevailing practices in irrigation management and discussions with field officers, prescribed proforma for use and submitted its report to Government in January 2003.

Based on the recommendations of the committee, Government issued Circular for water accounting and auditing of irrigation projects on 26-06-2003. Proforma for water accounting (I-A to V-A, I to V and VI & VII) are also issued. Checklists Part I & II are also issued vide proforma VIII & IX. These checklists give an exhaustive list of documents and items to be checked during inspections and auditing.

1. According to the above mentioned circular, Form No.126 (e) which was used till now for keeping account of water use in every rotation of irrigation is revised & keeping water account in the prescribed proforma has been made mandatory for every major, medium & minor irrigation project.
2. Water account shall be maintained by each irrigation section in proforma IA to V-A & by Sub division in proforma I to V. The proforma are to be submitted by the sectional officer to sub division within three days after completion of irrigation rotation. The responsibility of submitting the compiled information to division office within seven days shall lie with sub division.
3. Annual water account of all major & medium projects shall be maintained in Proforma VI.
4. Annual water account of all minor Irrigation projects shall be maintained in Proforma VII.
5. Annual water account of all projects (Proforma VI & VII) is required to be submitted by concerned Superintending Engineer, to Maharashtra Water and Irrigation Commission's office (proposed Water Resources Development Centre) within 45 days (before 14th August) after every irrigation year.
6. Proforma VIII & IX (check lists) are prescribed for water auditing.
7. Three water audit cells, each headed by an Executive Engineer are established under the administrative control of MWIC for six revenue regions of the State. They are :
 - a. Unit I Amravati & Nagpur region
 - b. Unit II Pune & Konkan region
 - c. Unit III Aurangabad & Nashik region
8. Water auditing of all irrigation projects in the State will be carried out once in a year or any time by MWIC Aurangabad with directives from Government in case of serious complaints.
9. For assessing the efficiency of irrigation, criterion of ha/Mcum shall be adopted instead of the present practice of AI/DC (area irrigated per day cusec)
10. The data regarding rainfall & evaporation is required to be submitted to division regularly even if there is no irrigation rotation during a season.

11. The compliance of the remarks raised by Maharashtra Water and Irrigation Commission office after scrutiny of water account reports is done by e-mail and paperless working procedure be followed hereafter. For water auditing, additional establishment has been made available by Government of Maharashtra.

4.5 Salient features of Water Audit Performance

The proforma I, II, III, IV & V are to be compiled by respective sub-divisions and submitted to the Executive Engineer. Similarly, the proforma I-A, II-A, III-A, IVA and V-A are to be submitted to the respective sub-divisions by the irrigation sections looking after management of the project.

I. Proforma-I: Water Demand

This proforma (separately for various canals for each rotation of irrigation year) is to be submitted by the sub-division to the division office prior to starting of a rotation. It is compilation of demands (proforma I-A) received from various sections. This format is for indenting water for the forthcoming rotation. The requirement of water for various crops for a particular section shall be calculated as per directives issued by the Government from time to time or from projected ha/Mcum.

II. Proforma –I-A: Water Indent

This proforma is to be submitted by the respective sections to their subdivisions. This is similar to proforma-I but it gives information of area expected to be irrigated by flow & lift separately. Lift irrigation includes canal lifts, river lifts and reservoir lifts within the jurisdiction of that section. This indent shall be submitted for each rotation one week before start of rotation.

III. Proforma-II: rotation

This proforma shall be compiled by the sub-division and submitted to the division office within a week.

Proforma-II-A: Discharge drawn at various locations of canal.

Proforma II-A shall be submitted by each section as soon as the rotation is over (within three days of completion of rotation). Discharges at various locations of canal, tail of canal, tail tank shall be fully considered while submitting this proforma.

Proforma-III and III-A: Water Used and Area Irrigated.

The proforma III relates to the water used and area irrigated in each rotation. This proforma gives the figures of areas under various heads as actually irrigated. This information is to be supplied by the sectional officer within three days after each irrigation rotation in proforma III-A. The proforma III shall be compiled by sub-division and submitted to the division within a week's period after finishing the rotation of canal.

IV. Proforma IV-A & IV: Discharge let-out through Scouring Sluices or Escapes

It gives information in connection with discharges let through the scouring sluices and escapes. It is important to watch that the water thus let out is the least possible mentioning reasons therefor.

V. Proforma – V-A & V: Rainfall & Evaporation

Details of rainfall & evaporation in the command area of the section are to be given in proforma V-A by the sectional officer. Compiled information of all the sections is to be submitted by the sub-division to the division in proforma V. Proforma V-A & V should be submitted after each rotation as well as at the end of each month irrespective of whether there is irrigation rotation or otherwise.

Chapter 5. Backlog & removal of Regional Imbalance

To remove regional imbalance & to workout region wise backlog a committee was formed in 1982 under the Chairmanship of Dr. Dandekar. The backlog worked out by the committee is as under—

Region	Backlog in 000 ha.(SRE)
Konkan	105.58
Tapi	197.68
Krishna	238.64
Marathwada	316.71
Nagpur	110.44
Amrawati	416.87
State average=35.11	

5.1 Indicators & backlog committee in 1995-97 (by Hon. Governor) As Per Base year 1994

Region	Backlog in 000 ha.(SRE)	Financial in CRS
Konkan	76.68	384
Tapi	91.21	513
Krishna	0	0
Marathwada	430.64	2401
Nagpur	99.04	638
Amravati	685.68	3445

5.2 Indicators & backlog committee in 1995-97 (by Hon. Governor) base year 1994

Region	Backlog in 000 ha.	Financial in CRS
ROM ¹	167.9	934
Marathwada	430.64	2401
Vidarbha	784.73	4083
Moh	1383.26	7418
State average -- 35.11		

5.3 Backlog in WR² in 1999

Region	Backlog in 000 ha.	Financial in CRS
ROM	89.68	487.91
Marathwada	284.7	2173.95
Vidarbha	570.74	3956.52
Moh	945.13	6618.38

¹ Rest Of Maharashtra

² Water Resources

5.4 Backlog in WR in 2002

Region	Financial in CRS
Kokan	206.55
Tapi	100.3
Krishna	0
Marathwada	1709.65
Nagpur	185.73
Amrawati	2970.8
State average = 41.43	

5.5 Backlog in WR in 2002

Region	Financial in CRS.
Rom	322.56
Marathawada	1709.65
Vidarbha	3136.51
Moh	5168.72
State average= 41.43	

5.6 Backlog in WR in 2007

Region	Backlog in 000 ha.	Financial in CRS
Kokan	69.93	285.97
Tapi	19.76	168.66
Krishna	0	0
Marathawada	284.7	2173.95
Nagpur	51.53	409.66
Amaravati	519.21	3546.89

5.7 Governors Directives

1. Available budget for Irrigation Sector Improvement shall be distributed circlewise.
2. Budget allocation shall be as per weighted average factors.
3. Hon. Governor has given directives to remove backlog within five years(2001-02 to 2005-06.)
4. In order to remove backlog ending Mar 2002(Rs 5168.72 crores) within in next four years Rs 1292 crores are required.

5.8 Guidelines for removal of Backlog- Table

Year	Backlog	Population	Net sown area
2002-03	35	40	25
2003-04	45	30	25
2004-05	55	20	25
2005-06	65	10	25

Chapter 6 Accelerated Irrigation Benefit Programme

6.1 About AIBP

A large number of river valley projects, both multipurpose and irrigation have spilled over from Plan to Plan, mainly because 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 desired benefits. There are 162 Major, 240 Medium and 74 ERM on-going irrigation projects in the country at various stages of construction at the end of VIII Plan (i.e. end of 1996-97) with spillover cost of Rs. 79,321.39 crore. This was a matter of grave concern for the Union Government and expeditious steps for the completion of some of the projects, which were in advanced stage of completion, had to be taken.

With this end in view, the Government of India had launched the Accelerated Irrigation Benefit Programme during 1996-97 for accelerating implementation of on-going irrigation/multi-purpose projects on which substantial progress had been made and, which were 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 benefits of irrigation in next four agricultural seasons.

Only those projects are considered under the Programme, which have the investment clearance of the Planning Commission. The Projects which are already receiving assistance from domestic agencies such as NABARD etc. are not eligible for assistance under this Programme. However, the components of such projects which are not covered under such assistance by NABARD are considered for inclusion under the AIBP. Assistance to large projects is given for their phased completion so that benefits could start flowing early with comparatively smaller investments.

Projects benefiting tribal/ drought prone areas are given due preference provided they are otherwise eligible. Priority is also given to Inter-State projects and all the party States are eligible for assistance under the Programme individually. Projects with larger irrigated area per unit of additional investment are preferred. Minor irrigation schemes are not eligible for assistance under the AIBP because of NABARD financing such schemes under the Rural Infrastructure Development Fund (RIDF).

The Central Loan Assistance (CLA) to the States is given on matching basis and is released in two installments of 50% each. The second installment is released after the States have incurred expenditure equal to the sum of the CLA already released to them and the share of the state. The Central Loan Assistance under the Programme is given in the form of loan at the rate of interest prescribed by the Ministry of Finance from time to time. The loan under the Programme is repayable in 20 equal installments together with interest on the outstanding balance commencing from the following year. However, 50% of the loan enjoys 5-years of initial grace period after which repayment of the loans will be affected in 15 equal installments. The loans actually payable in a year will be recovered in 10 equal monthly installments commencing from June every year. The projects covered under 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. During 1996-97, Rs. 500.00 crore was released to 52 projects in 18 States.

6.2 ABIP Norms

1. Major projects to be considered those are nearly to completion and having remaining less work.
2. The projects are taken on the priority have –
 - a. Work to be completed within 3-4 years.
 - b. 50% expenditure to be paid.
 - c. Belong to tribal majority or draught area.
 - d. Interstate plans
3. When one plan is completed then another can be considered

6.3 Conditions for Financial Assistance

1. The assistance of the Central and State share of 2:1.
2. If Projects are completed within stipulated period then the loan assistance is liberalized 30% grant.
3. New Projects are considered for assistance in lieu of completed ones.
4. Project to be completed within 3 years period, considered under fast track. The financial assistance from Central Govt. will be considered as 70% loan and 30% grants.

6.4 Eligibility Criteria for Funding

Major, medium and Extension, Renovation & Modernization (ERM) irrigation projects

- a) having investment clearance of Planning Commission
- b) are in advanced stage of construction and can be completed in the next four financial year
- c) are not receiving any other form of financial assistance can be considered for inclusion in the programme. Components of the projects not receiving any other form of financial assistance can also be considered for inclusion in the programme. The eligibility criteria as per prevailing guidelines for selection of ERM project will continue.

New project could be included in programme only on completion of an ongoing project under AIBP on one to one basis EXCEPT FOR projects benefiting-

- a) drought-prone areas;
- b) Tribal areas;
- c) states with lower irrigation development as compared to national average; and
- d) districts identified under the PM's package for agrarian distress districts.

Surface minor irrigation (MI) schemes (both new as well as ongoing) of states of North-East, Hilly states (Himachal Pradesh, Sikkim, Jammu and Kashmir and Uttaranchal) and drought prone KBK districts of Orissa which are approved by State TAC / State Planning Department will be eligible for assistance under the programme provided that-

1. individual schemes are benefiting irrigation potential of at least 20 ha.
2. group of schemes (within a radius of 5 km) benefiting total ultimate irrigation potential of at least 50 ha.
3. proposed MI schemes have benefit cost ratio of more than 1 and

4. the development cost of these schemes per ha. is less than Rs.1.00 lakh. For Non-special category states, only those minor irrigation schemes with potential more than 50 hectare which serve tribal areas and drought prone areas could be included under AIBP. The schemes to be taken up will be decided in consultation with Planning Commission.

6.5 Terms of Funding and Mode of Disbursement

1. The central assistance will be in the form of central grant which will be 90% of project cost in case of special category States*, projects benefiting drought prone area, tribal area and flood prone area and 25% of project cost in case of Non-special category States**. The balance cost of the project as the state's share is to be arranged by the state government from its own resources.
2. During a financial year, the sanctioned grant will be released in two installments. The first installment based on projected outlay and the second installment after confirmation of expenditure. The grant component amounting to 90% of the total grant sanctioned will be released immediately and balance 10% will be released when 70% of the agreed expenditure is incurred. Funding for the years subsequent to the first year will be based on the confirmation of expenditure of the previous years.
3. The grant component along with the state share must be released to the project authorities by the state governments within 15 days of its release by the Government of India.
4. State governments will be required to enter into an MoU¹ with the MoWR² (Annexure II for major/medium projects and Annexure III for minor irrigation schemes) for each individual project under the programme indicating balance cost, balance potential, year-wise phasing of expenditure vis-à-vis balance potential and agreement to create targeted irrigation potential in four financial years for major/medium projects and two financial years for minor irrigation schemes along with target date of completion. In addition to above, for minor irrigation schemes in Non-special category states, the state government would give an undertaking (Annexure-IV) for their completion on schedule in two financial years and formation of Water Users Association for post construction maintenance.
5. The Utilization Certificate shall be issued by the Chief Engineer of the project and countersigned by Secretary (Water Resources/ Irrigation)/ Secretary (Finance) of the state government. The Utilization Certificate must contain physical achievement of Irrigation Potential as agreed to in the MoU on year to year basis. In case, the physical achievements in a particular year are less than that agreed to in the MoU, further grant will be released only on achieving physical target. The final target date of completion will however not be changed from that entered into MoU.
6. If the State Governments fails to comply with the agreed date of completion, the grant component released will be treated as loan and recovered as per usual terms of recovery of the Central Loan.
7. The States would be required to submit audited statements of expenditure incurred on the AIBP component of the project within nine months of the completion of the financial year. The release of central assistance of the following years will not be

¹ Memorandum of Understanding

² Ministry of Water Resources

considered if audited statement of expenditure is not furnished within nine months of release of central assistance.

8. The State Governments should confirm the project specific budget provision for work to be done under AIBP on year to year basis.

6.6 Monitoring of Projects

1. A comprehensive physical and financial periodical monitoring of major/medium projects will be carried out by Central Water Commission/Ministry of Water Resources and Ministry of Programme Implementation with emphasis on quality control. The monitoring visit and submission of Status Reports will be carried out by the Central Water Commission at least twice a year for the period ending March and September of the year. The releases of subsequent installments will be based on physical and financial verification and the recommendations of Central Water Commission to the satisfaction of Ministry of Water Resources. The latest techniques such as monitoring through Remote Sensing Technology may be used by the Govt. of India to monitor the progress of works specifically, the Irrigation Potential created and States are required to provide necessary input details of Project to the Central Govt. from time to time even after completion of Project.
2. Monitoring of the minor irrigation schemes has to be done by the State Government themselves through agencies independent of construction agencies. These schemes would also be monitored periodically on sample basis by Central Water Commission and assessed against predetermined targets by the Ministry of Water Resources. The Special Category States covers the North Eastern States, Sikkim, Himachal Pradesh, Jammu & Kashmir, and Uttaranchal. The projects in the undivided Koraput, Bolangir and Kalahandi (KBK) districts of Orissa will also be treated at par with Special Category States.

All other states not covered in special category shall be Non-Special Category States

Chapter 7 MWRRA

7.1 About MWRRA

The Maharashtra Water Resources Regulatory Authority (MWRRA), set up under an Act in August 2005, is the first of its kind in the country. One of the important functions of the Authority is to determine the distribution of Entitlements for various categories of use and ensure through regulation enforcement of the determined Entitlements. Six projects in the Krishna Basin viz. Kukadi & Ghod (major), Mangi (medium) and Wafgaon, Diwale & Benikre (minor) have been selected initially for fixing and enforcing Entitlements on a pilot basis starting rabi/hot weather season of 2006-07.

7.2 Powers, functions and duties of Authority.

The Authority shall exercise the following powers and perform the following functions, namely:-

- a) to determine the distribution of Entitlements for various Categories of Use and the equitable distribution of Entitlements of water within each Category of Use on such terms and conditions as may be prescribed;
- b) to enforce the decision or orders issued under this Act
- c) to determine the priority of equitable distribution of water available at the water resource project, sub-basin and river basin levels during periods of scarcity;
- d) to establish a water tariff system, and to fix the criteria for water charges at sub-basin, river basin and State level after ascertaining the views of the beneficiary public, based on the principle that the water charges shall reflect the full recovery of the cost of the irrigation management, administration, operation and maintenance of water resources project ;
- e) to administer and manage interstate water resources apportionment on river systems, of the State;
- f) to review and clear water resources projects proposed at the subbasin and river basin level to ensure that a proposal is in conformity with Integrated State Water Plan and also with regard to the economic, hydrologic and environmental viability and where relevant, on the State's obligations under Tribunals, Agreements, or Decrees involving interstate entitlements:
Provided that, while clearing the new water resources projects by the concerned for construction proposed by River Basin Agencies, the Authority shall ensure that Governor's Directives issued from time to time, relating to investment priority for removal of regional imbalance are strictly observed; Provided further that, in respect of the projects situated in Maharashtra and Vidarbha Regions, the powers to accord administrative approval or revised administrative approval, under this clause, shall in accordance with the Governor's directives, be exercised by the concerned River Basin Agency.
- g) to lay the criteria and monitor the issuance of Entitlements. These criteria among others shall also include the following,-
 - i. The Entitlements shall be issued by River Basin Agency based on the Category of Use and subject to the priority assigned to such use under State Water Policy;
 - ii. Bulk Water Entitlements shall be issued by the River Basin Agency for irrigation water supply, rural water supply, municipal water supply or

- industrial water supply to the relevant Water User Entities including Municipalities, Water User's Associations, Industrial Users and State agencies responsible for delivery to the respective sector or to a Sub-surface Water User's Association or entity that operates a well field of multiple sub-surface water tube wells, bore wells or other wells on behalf of multiple users;
- iii. Bulk Water Entitlements for irrigation, shall be issued by River Basin Agency, to the Water User's Associations at the primary unit level, Distributory level and Canal or Project level Associations and River Basin Agencies shall not receive Entitlements but shall act as conveyance entities for the Entitlements issued to the Water User's Associations;
 - iv. Water User Entities including Water User's Associations, managing the aggregate of Entitlements on behalf of a group of Entitlement holders may be issued an Aggregate Bulk Entitlement;
 - v. Individual Water Entitlements may be issued by River Basin Agency only for the construction and operation of individual lift irrigation schemes from surface water sources, bore-wells, tube wells or other facilities for extraction of sub-surface water. Such Entitlements shall be administered, registered measured and monitored by the respective River Basin Agency in close co-ordination with relevant Government agencies. Where such facilities extract water from alluvial aquifers that are conjunctive with the surface water of a basin, the issuance and operation of such Entitlements shall be conjunctively co-ordinated with the use and yield of surface water resources of the basin and shall be compatible with the overall water resource plan of the local area and the respective river basin and the sustainable use of the sub-surface water resources.
 - vi. Bulk Water Entitlements shall be for a specific proportion of flow, storage or other determination of the annual yield of a water resources or facility and the Entitlement shall be measured volumetrically and with respect to time of delivery and flow rate of delivery;
 - vii. The allocation of a percentage of the water available under the Entitlements of each facility, in the drainage basin or river basin shall be determined jointly by the River Basin Agencies and Water User Entities based upon the hydrology and other relevant parameters with regard to the specific basin. This allocation shall be utilised for the determination of the amount of water to be made available under each Entitlement for that specific year or runoff season;
 - viii. to lay down the criteria for modification in Entitlements for the diversion, storage and use of the surface and subsurface waters of the State. These criteria shall among others, include the following:-
 - i. Aggregate Bulk Water Entitlements will be considered as Bulk Water Entitlements under the provisions of this Act except that they shall not be a usufructuary right and will only be adjusted by the Authority if there is a compensating change, under the provisions of this Act, to any component Bulk Water Entitlement that comprise part of the Aggregate Bulk Water Entitlement;
 - ii. In the event that any Water User Entity wishes to use its category priority to mandate a change in the use or volume of any Entitlement, that entity must demonstrate in a public hearing before the Authority, that it has exhausted all attempts to conserve, increase efficiency and manage its demand of water within its, Entitlement and has exhausted

all opportunities to increase its Entitlement through a transfer within the voluntary, market-based economy. If after such a public hearing, the Authority deems such a mandated transfer, on either an annual or permanent basis, to be legal and necessary in the interest of the people of the State, the Authority shall then determine a fair and just compensation as determined by the market value of the water resource, to be paid to the Entitlement holder by the entity exercising the mandated user category preference;

1. to fix the criteria for trading of water Entitlements or Quotas on the annual or seasonal basis by a water Entitlement holder. These criteria shall among others, include the following,-
 - (i) Entitlements, except Aggregate Bulk Water Entitlements, are deemed to be usufructuary rights which may be transferred, bartered, bought or sold on annual or seasonal, basis within a market system and as regulated and controlled by the Authority as established in the rules of the Authority;
 - (ii) Quotas of water determined by the seasonal or annual allocation assigned to an entitlement shall be volumetric usufructuary rights which may be transferred, bartered, bought or sold on an annual or seasonal basis within a market system as established and controlled by the rules of the Authority;
 - (iii) Bulk Water Entitlements or Quotas shall be transferable within the respective category of use as long as such transfers are compatible with the operation of the specific water resource facilities involved. Such annual transfers shall be managed and registered with the respective River Basin Agency which shall have the power to approve or deny such proposed transfers if they are incompatible with the operation of the facility or would damage the Entitlements or rights of other users within the system. The River Basin Agency may charge a nominal fee for the processing and registering such transfer but shall not participate in any compensation between Entitlement holders as a part of such transfer.
- a. Entitlements may be subject to review at intervals of not less than three years and then, only if warranted by concerns about, the sustainability of the level of allocation;
- b. Bulk Water Entitlements shall be registered by the River Basin Agency and shall be monitored by the Authority or its duly delegated competent representative;
- c. permanent transfer of Entitlements shall only be made with the approval of the respective River Basin Agency and the Authority and in compliance with the rules of the Authority promulgated for this purpose. All approved transfers shall be entered into the registry of Entitlements of the Authority;
- d. in the event of water scarcity, the Authority, in compliance with its policy and rules for allocating such scarcity, shall adjust the quantities of water to be made available to all Entitlements and shall permit the temporary transfer of Water Entitlements between users and Categories of Users in accordance with the approval of the River Basin Agencies;

- e. to establish regulatory system for the water resources of the State, including surface and sub-surface waters, to regulate the use of these waters, apportion the Entitlement to the use of the water of the State between water using categories.;
 - f. to establish a system of enforcement, monitoring and measurement of the Entitlements for the use of water that will ensure that the actual use of water, both in quantity and type of use are in compliance with the Entitlements as issued by the Authority;
 - g. to administer the use and Entitlement of water resources within the State in a manner consistent with the State Water policy to ensure the compliance of the obligation of State with regard to the apportionment of interstate waters between the State and other States;
 - h. to promote efficient use of water and to minimize the wastage of water and to fix reasonable use criteria for each Category of Use;
 - i. to determine and ensure that cross-subsidies between Categories of Use, if any, being given by the Government are totally offset by stable funding from such cross-subsidies or Government payments to assure that the sustainable operation and maintenance of the water management and delivery systems within the State are not jeopardised in any way;
 - j. to develop the State Water Entitlement data base that shall clearly record all Entitlements issued for the use of water within the State, any transfers of Entitlements and a record of deliveries and uses made as a result of those Entitlements;
 - k. to facilitate and ensure development, maintenance and dissemination of a comprehensive hydro-meteorological information data base in co-operation with the River Basin Agencies;
 - l. the Authority shall review and revise, the water charges after every three years;
 - m. The Authority may ensure that the Irrigation Status Report is published by the Government every year, such report shall contain all statistical data relating to irrigation including details in respect of districtwise irrigation potential created and its actual utilisation;
- such other powers, function and duties as may be prescribed

Chapter 8 Field Visit: Asolamendha Project

8.1 About Visit

As per schedule of training program, we visited Asolamendha project on 13th February 2008. Shri. Vaidya saheb assisted us and provided details of the project. The Asolamendha project is situated at Pathari village, Sawali Talhsil of Chandrapur district.



Asolamendha Project Canal

The salient features of the project are-

➤ Catchment area	=	245.53 sq.km
➤ Water Availability	=	115.71 Tm ³
➤ Dam type	=	Earthen Dam
➤ Water Storage	=	67.015 Tm ³
➤ Dead Storage	=	10.64 Tm ³
➤ Live Storage	=	56.375 Tm ³
➤ Length of dam	=	1608.22 m
➤ Type of spillway	=	Flush Bar
➤ Length of Spillway	=	231.70m
➤ Maximum spillway discharge	=	758.00 m ³ /sec
➤ Discharge capacity	=	758 m ³ /sec
➤ Maximum height of dam	=	18.08m
➤ Maximum height of water	=	12.88m
➤ Area under submergence	=	1880.00 ha

➤ Villages under command	=	67
➤ Highest Bund Level	=	217.07m
➤ Full Reservoir Level	=	211.87m
➤ Minimum Draw Down Level	=	208.23m
➤ River Bed Level	=	198.99m
➤ Canal Bed Level	=	208.23m
➤ Canal Discharge	=	9.6m ³ /sec
➤ Command area	=	50858ha
➤ Irrigable area	=	9919 ha
➤ Construction work started	=	1903
➤ Construction completed	=	1918



Asolamendha Project



Asolamendha Project Flush type fall

Conclusion

One week training session at Chief Engineer (Water Resources), Nagpur started on 11th February 2008 and ended on 16th February 2008.

On 11th February 2008, Shri. M.I Shaikh Saheb, Chief Engineer, interacted with us; personally I felt that it was the most enjoying part of the training, since he briefly explained each and every activity related to the Water Resources Department. He started with the deficiency of water and non availability of ideal sites for the water resources projects, so he stressed on effective and optimum utilization of the existing sites by using technical knowledge.

As per directions of the Chief Engineer, we learned various issues such as-Water Use efficiency, State Water Policy, Maharashtra Water Resources Regulatory Authority (MWRRA), Maharashtra Water Resources Management by Farmers, Benchmarking or Irrigation Projects, Water Audit, Irrigation Backlog, Maharashtra Water Sector Improvement Project (MWSIP), Water Users' Association (WUA), Forest Act, Land Acquisition and Rehabilitation, Budgeting etc. He also suggested interacting with officers and as per his directions; we completed the given study as well as learn several other things.

This report includes the brief of all these studies performed and understand by me. It was very nice experience to get in depth knowledge through systematic schedule.

This report includes the day-to-day details of training program at Chief Engineer office, Nagpur. It also contains the study and observations performed by me.

I am thankful to all the staff of the Chief Engineer office, Nagpur for giving me an opportunity to learn about several administrative and technical things.

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