

A study by Water & Land Management Institute (WALMI), Aurangabad  
for Water Resources Department (WRD), Govt. of Maharashtra (GOM) and  
Maharashtra Water Resources Regulatory Authority (MWRRA), Mumbai

Report  
of  
Study  
on  
  
Revision  
of  
Maintenance & Repairs Norms  
for  
Irrigation Projects in Maharashtra

WALMI, Aurangabad (M.S.), India  
July 2008

## **Preface**

A Study on Revision of Maintenance & Repairs Norms for Irrigation Projects in Maharashtra was assigned to WALMI, Aurangabad by Water Resources Department, GOM and Maharashtra Water Resources Regulatory Authority in the context of on-going Water Sector Reforms.

It has become obligatory to revise the M&R Norms adopted in year 2002 in view of price escalation and needs felt by end management functionaries. Revised M&R Norms would have a bearing on the Water Tariff. This explains the importance and necessity of the Study.

WALMI study group has carried out the Study based on field data obtained from the selected projects and has tried to develop a rationale behind the proposed revision.

It is hoped that the revised M&R Norms as proposed under this Study would not only meet the field requirements but would also add a new dimension to the policy on Maintenance & Repairs of the irrigation systems in Maharashtra.

Vast field experience and vision of Senior Experts and their valuable guidance and significant contribution have made this Study possible in its present form and with conceptually different contents. Efforts taken by the Liaison Officers in collection of data provided a strong base for the Study. WALMI acknowledges with sincere thanks the contribution made by both the Senior Experts and Liaison Officers.

Thanks are also due to the Field Officers, who furnished the valuable data in time and in prescribed manner.

Studied comments and valuable suggestions by all concerned are welcome.

Place : Aurangabad  
Date : July 2008

**(C.S. Modak)**  
Director General

## **Executive Summary**

A study on Revision of Maintenance and Repairs Norms for State Sector Irrigation Projects in Maharashtra was given to WALMI, Aurangabad by Water Resources Department and Maharashtra Water Resources Regulatory Authority in the context of on-going Water Sector Reforms.

The revision of M&R Norms adopted in the year 2002 has become necessary in view of price escalation and felt needs by the field officers. Revised M&R Norms would also have a bearing on the Water Tariff. This explains the importance and necessity of the present study.

WALMI has carried out the said Study with the help of Senior Experts and Liaison officers (Refer: List of contributors).

An attempt has been made in this Study to select different types of irrigation projects (Table-1) with varying conditions and parameters from all regions of Maharashtra for collecting and analyzing M&R data.

A set of specially designed proformae (Annex-4) has been used to collect M&R data for last 10 years (1997-98 to 2006-07). Liaison Officers collected the data from respective Project Authorities and Senior Experts analyzed the data. From available data, it is seen that the demands made by field officers for M&R Grants are significantly more than both the permissible expenditure as per norm and actual expenditure. This fact indicates the necessity to revise the M&R Norms.

Brief review of recommendations of earlier studies / reports such as Jakhade Committee, Twelfth Finance Commission and XI Five Year Plan has been taken (Paragraph 5.1). Evolution of M&R Norms in Maharashtra has also been discussed (Paragraph 5.2) to understand their values and constraints.

On this background, an attempt has been made to develop a rationale (Para 5.32) for the proposed M&R Norms (Refer Annex-8 of the

Abstract). The rationale now developed is different from the logic so far used for fixing M&R Norms in Maharashtra.

Basic norms (Refer: Tables 7 to 10) are proposed in general to cover all projects in Maharashtra. However, Specific Adjustments over and above basic norms are also proposed (Refer: Table-11) to address the specific needs of the project. Table below gives the gist of some of the important proposed norms vis-à-vis prevailing norms to clearly bring out the said different logic.

Sr. No.	Project category/ component	M&R Norms (excluding establishment charges)	
		Proposed	Prevailing
1)	Head Works	a) Considered separately b) Rs/Mm <sup>3</sup> of Design Live Storage	a) No separate consideration b) No linkage with volume and size of the storage
2)	Canals	a) Rs/ha of Actual Irrigated Area. b) Rs/ha of Balance Area (unutilized) [50% of (a)]	a) Rs/ha of Actual Irrigated Area b) Nil
3)	KT Weirs	a) KT Weirs with and without reservoir back-up considered separately. b) Rs/sq. meter of gate area	a) KT Weirs differentiated on the basis of gate height. b) Rs/ha. of Actual Irrigated Area
4)	Adjustments for specific conditions	(%) increase (over & above Basic Norms i.e. 1,2,3 above) proposed for BC soils, hilly area/high rainfall zone and age factor	Nil

Financial implication (Annex-12) of the proposed M&R Norms at State level works out to Rs. 221.46 Crores i.e. Rs. 370/ha of CCA including head works and specific adjustments.

In order to streamline the procedure for funding of M&R, some important recommendations (Para-6) regarding budget provisions, release of funds, computerized system of accounting & next revision of norms are also suggested in the report.

### **Abbreviations**

1)	BC Soils	Black Cotton Soils
2)	CCA	Culturable Command Area
3)	EE	Executive Engineer
4)	Er.	Engineer
5)	GOI	Government of India
6)	GOM	Government of Maharashtra
7)	GR	Government Resolution
8)	Ha	Hectare
9)	IMF	Irrigation Maintenance Fund
10)	KT Weirs	Kolhapur Type Weirs
11)	L. ha	Lakh Hectare (0.1 Million)
12)	LIS	Lift Irrigation Scheme
13)	LOC	Letter of Credit
14)	MI Tank	Minor Irrigation Tank
15)	MMISF	Maharashtra Management of Irrigation Systems by Farmers
16)	MOWR	Ministry of Water Resources
17)	M&R	Maintenance & Repairs
18)	MWIC	Maharashtra Water & Irrigation Commission
19)	MWRRA	Maharashtra Water Resources & Regulatory Authority
20)	NLBC	Nira Left Bank Canal
21)	NRBC	Nira Right Bank Canal
22)	Retd.	Retired
23)	Rs.	Rupees
24)	SE	Superintending Engineer
25)	SWP	State Water Policy
26)	WALMI	Water & Land Management Institute
27)	WRD	Water Resources Department
28)	WUA	Water Users Association

## **List of Contributors**

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- 2) Er. C.S. Modak, Director General, WALMI, Aurangabad

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- 2) Er. K.D.Shinde, Retd. Executive Director, WRD
- 3) Er. S.N.Lele, Retd. Chief Engineer, WRD & Chairman, SOPPECOM, Pune

### **Liaison Officers**

- 1) Er. A.S.Mali, Rtd. Executive Engineer  
(LIS & KT Weirs, Kolhapur & Sangli)
- 2) Er. B.K. Kanshetty, Retd. Executive Engineer (Kal Project)
- 3) Er. C.B.Kulkarni, Retd. Executive Engineer (Jayakwadi)
- 4) Er. A.G.Barate, Retd. Executive Engineer (Palkhed)
- 5) Er.P.A.Zalke, Retd. Executive Engineer (Paradgaon MIS, Nagpur)
- 6) Er. V.S. Ghanwat, Retd. Executive Engineer (Nira)
- 7) Er. J.M.Gabhane, Rtd. Sub Divisional Engineer (Katepurna)
- 8) Er. B.M.Khilari, Retd. Sub Divisional Engineer (Bhandardara)

### **Coordinator**

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Aurangabad

**Supporting Staff associated with the Study**

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2)	Shri S.U. Lungare, Jr. Engineer
3)	Shri V.R. Hadoltikar, L.G. Stenographer
4)	Shri P.P. Mande, Sr. Clerk
5)	Shri R.B. Bhalerao, Jr. Clerk
6)	Shri B.V. Kondke, Jr. Clerk
7)	Shri L.B. Solankar, Peon



**List of Data Providers**

<b>Sr. No.</b>	<b>List of Data Providers</b>	<b>Projects</b>
1)	SE., Thane Irrigation Circle, Kopari Colony, Thane –East.	Kal
2)	E.E., Raigad Irrigation Division, Kolad, Taluka Roha, District Raigad.	
3)	SE & Administrator, CADA, Nashik	Palkhed
4)	E.E., Palkhed Irrigation Division, Nashik	
5)	E.E., Ahemadnagar Irrigation Division, Ahemadnagar	Bhandardara
6)	S.E., Pune Irrigation Circle, Pune	Nira
7)	E. E., Pune Irrigation Division, Pune	
8)	E.E., (Neera Right Bank Canal, Phalatan) NRBC Division Phaltan.	
9)	SE & Administrator, CADA, Nagpur	Paradgaon MIS
10)	E.E., MID, Nagpur	
11)	S.E., Akola Irrigation Circle, Akola	Katepurna
12)	E.E., Akola Irrigation Division, Akola	
13)	S.E., Kolhapur Irrigation Circle, Kolhapur	LIS & KT Weirs
14)	E.E., Kolhapur Irrigation Division, Kolhapur	
15)	S.E., Krishna Koyana Lift Irrigation Circle, Sangli	
16)	E.E., Takari Pump House Division -1, Islampur, Tal. – Walwa, Dist. – Sangli	
17)	S.E., Sangli Irrigation Circle, Sangli	
18)	S.E.& Administrator, CADA, Aurangabad	Jayakwadi
19)	SE & Administrator, CADA, Beed	
20)	E.E., Jayakwadi Irrigation Division - 1, Paithan	
21)	E.E., Jayakwadi Irrigation Division - 2, Parabhani	
22)	E.E., Jayakwadi Project Drainage Construction Division -3, Beed	

A Study by WALMI, Aurangabad

**Report of Study on  
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for  
Irrigation Projects in Maharashtra**

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## **Report of Study on Revision of Maintenance & Repairs Norms for Irrigation Projects in Maharashtra**

### **1. Genesis**

Water Resources Department (WRD), Government of Maharashtra (GOM) has initiated Water Sector Reforms on a large scale. They were initiated by the Maharashtra Water & Irrigation Commission's (MWIC) Report in 1999. MWIC took a critical review of complete water sector and gave a sort of road map for the future. Based on MWIC's report, Maharashtra then consciously adopted State Water Policy (SWP) in July 2003. The State even enacted two important Water Laws, namely, the Maharashtra Water Resources Regulatory Authority (MWRRA) Act & the Maharashtra Management of Irrigation Systems by Farmers Act (MMISF) Act in the year 2005, to implement the SWP and provide legal support to Water Sector Reforms. An independent Regulatory Authority, namely, MWRRA has also been established for systematic regulation of the said Water Laws & Reforms.

The on-going process of Water Sector Reforms brought forward the important issue of Revision of Norms for Maintenance & Repairs (M&R) of Irrigation Projects and its linkages with Water Tariff.

On this background, the WRD & the MWRRA requested the Water and Land Management Institute (WALMI), Aurangabad to carry out a Study on Revision of M&R Norms.

WALMI has carried out the said Study with the help of Senior Experts and Liaison Officers (Refer: List of contributors). This report is the outcome of that study.

## **2.0 Objective**

Objectives of the present study are as follows:

- To revise Norms for Maintenance and Repairs of Irrigation Projects in Maharashtra giving due importance/consideration to –
  - Price escalation
  - Felt need of ensuring adequate funding for Systemic & Systematic Maintenance of the Irrigation Systems so as to improve the irrigation performance and increase the irrigation efficiency, coverage of irrigation and productivity of the crops.
- To help develop a rationale along with scientific data base, for taking informed and considered decisions regarding Revision of Norms for Maintenance & Repairs of Irrigation Projects.

## **3.0 Scope**

The scope of this study is limited to –

1. Financial norms for M & R.
2. State Sector Irrigation Projects
3. Data & information as obtained from the Field Officers of selected projects, through Liaison Officers, specially appointed by WALMI for the purpose.

## 4.0 Methodology

### 4.1 Selection of projects

(1) WRD, while assigning the present study to WALMI, Aurangabad had mentioned in its letter (vide letter No.संकीर्ण (२००७/(१३/२००७)/सिन्धु(कामे) दि. २२/०१/२००७ presented here as Annex-1) following irrigation projects from different regions of Maharashtra.

Sr. No.	Region	Projects	
		Major	Medium
1)	Konkan	Kal	Amba
2)	Pune	Nira	Siddhewadi
3)	North Maharashtra	Bhandardara	Panzara
4)	Marathwada	Jayakwadi	Kalyan
5)	Nagpur	Bagh	Venna
6)	Amravati	Katepurna	Dyananganga

- (2) WRD, in its said letter, had also suggested WALMI to select a few KT Weirs, Minor Irrigation Schemes & LIS for the study.
- (3) In subsequent meeting at MWRRA on 22/2/2007 (Ref: MWRRA Letter No: 326 dt. 26<sup>th</sup> February 2007) Member (Water Resources Experts), MWRRA opined that “it may be desirable to confine the study for few projects only but make the study in detail and in-depth one”. As such, following projects were selected in the said meeting at MWRRA



<b>Sr. No.</b>	<b>Region</b>	<b>Projects</b>
1)	Konkan	Kal
2)	North Maharashtra	Bhandardara
3)	Marathwada	Jayakwadi
4)	Pune	Sina Mhada (Lift)
5)	Amravati	Katepurna
6)	Pune	Nira

- (4) It was also suggested in the said meeting at MWRRRA to select one KT weir from Ahmednagar/Kolhapur District and one MI Tank from Nagpur.
- (5) On this background, WALMI finally selected projects given in Table-1 for the study based on “Purposive Selection Method”. From Table-1, it is clear that an attempt has been made to select different types of projects with varying conditions and parameters from all regions of Maharashtra. Sina Mhada LIS was dropped because it is still incomplete. Palkhed project was added to make the sample more representative. Availability of data as also the criterion.
- (6) The sample selected for the study comprises of following –

<b>Project Category</b>	<b>Numbers</b>
Major	4
Medium	2
Minor	1
Govt. LIS	1
KT Weirs	42
Storage Tanks	5

#### 4.2 **Development of proformae for data collection**

- (1) MWRRA had identified a check-list (Annex-2) for data to be collected for revising M & R norms and had requested WALMI to vet the same (vide its letter No: 326 dated 26/2/2007).
- (2) WALMI had also identified various action points (Annex-3) for the purpose.
- (3) Both Annex-2 & 3 were discussed at length during the meeting with Senior Experts and Liaison Officers at WALMI, Aurangabad on 11/10/2007. Based on the suggestions given by the Senior Experts, a set of proformae was designed by WALMI, Aurangabad for collection of data from the selected projects.
- (4) The set of proformae was sent to the Senior Experts, Liaison Officers and the Project Authorities. Based on very good suggestions, especially, from the Senior Experts, WALMI revised the set of proformae. During the meeting with the Senior Experts and Liaison Officers at WALMI on 21/2/2008, the revised set of proformae was again thoroughly discussed. Specific instructions, in fact, were also given to the Liaison Officers regarding how to fill up the proformae.
- (5) Revised Set of Proformae finally used for collection of data in the present study is presented here as Annex-4. The proformae are self-explanatory and generally cover all the points that are logically required to revise the M & R Norms and to prepare guidelines for project specific O&M Manual.

(6) Given the constraints of budget, man power and time, data collection for a period of last 10 years (1997-98 to 2006-07) was considered to be reasonably adequate to even out the effects of following –

- Vagaries of nature (good or bad years, natural calamities, etc.)
- Administrative difficulties of / procedural changes made by WRD (actual availability of M & R Grants, transfer of projects from WRD to Irrigation Development Corporations and back.)
- Project specific constraints (e.g. mishaps on canals)

M & R Norms were last revised by WRD, GOM in the year 2002. The period selected for data collection, thus, covers 5 years prior to 2002 and 5 years after 2002.

#### 4.3 **Data Analysis**

4.31 Following M & R data for a period of last 10 years (1997-98 to 2006-07) were officially collected by the Liaison Officers from the Project Authorities of selected projects as per the revised set of proforma.

- (1) Permissible amount of M & R Funds as per the then applicable M & R Norms.
- (2) M & R Funds demanded by the Project Authorities.
- (3) M & R Funds received by the Project Authorities.
- (4) Actual expenditure incurred on M & R by the Project Authorities.

An attempt was also made to collect above data componentwise (i.e. break-up for Head works, Main/Branch Canal, Distributaries & Minors).

4.32 The Senior Experts critically analyzed the collected data and information. Wherever required they asked for additional data/information to bridge the gaps in the data/information. Senior Experts, in fact, made it a point to even personally visit two projects viz: Nira & Katepurna to get a feel of the present M & R Scenario and discuss about the same with the concerned Project Authorities. The data made available by the project officers is not complete in all respects. There are large variations in respect of internal consistency. However in future, there is scope for improvements in the data for revision and updating of M&R Norms.

#### 4.4 **Findings**

In the light of above observations and subject to the constraints due to the quality of available data, the Senior Experts have arrived at following findings.

- (1) The data / information are collected for ten years (1997-98 to 2006-07). Effort was made to reduce the figures of demands and actual expenditure to one specific year to account the escalation. But there is no consistency and uniformity in the demands, budgetary provisions and the actual expenditure in the last ten years. All these are varying to a large extent and hence it was decided to rely on arithmetical averages. Further due to these variations in the demands and actual expenditure, specific impact on the system performance by way of increase or decrease in the irrigation coverage vis a vis the expenditure incurred on Maintenance, is not visible in any of the project.
- (2) M & R Records, perhaps, are not maintained in the prescribed formats, which would have facilitated regular and systematic monitoring as per the guidelines laid down in GR / Circulars regarding M & R Norms.

- (3) In absence of properly classified componentwise M & R Expenditure, it is difficult to analyze what was planned and what was achieved. It is, therefore, difficult to assess the actual need based M & R requirements of the irrigation systems.
- (4) Table-2 gives average picture of project wise comparison of permissible grants, demands and actual expenditure in respect of M & R of selected projects. From this table as well as from the discussions with Project Authorities it is seen that
- (i) The demands for M & R Grants are:
- Not as per need-based estimates.
  - Not as per the permissible amount worked out as per the applicable M & R Norms
  - Perhaps, some times inclusive of the balance works from the previous years, which could not be taken up, due to shortage of funds in those years and thereafter, repeated every year as the grants released in the subsequent years also were not adequate to undertake all the need-based repairs.
- (ii) In most of the years in the period under the study (1997-98 to 2006-07), barring the exception of 2 years, the M & R Grants were placed much higher than the limits indicated by the norms [This may, perhaps, indicate that prevailing norms were on the lower side and hence, inadequate.]
- (iii) The ratio of average demands to average permissible expenditure varies from 1.72 (NRBC) to 23.6 (Kal); average being 8.44
- (iv) The ratio of average demands to average actual expenditure varies from 1.5 (NRBC) to 2.56 (NLBC); average being 1.95

- (v) The ratio of average actual expenditure to average permissible expenditure as per norms varies from 1.15 (NRBC) to 11 (Kal); average being 4.5.
  - (vi) Ratios mentioned in (iii), (iv) & (v) above vary too much from project to project. This may be partly explained as the result of project specific factors (e.g. BC Soils, heavy rainfall, old project)
- (5) As the M & R Grants are generally not received on time, the Project Authorities commonly carry out M & R works such as desilting & weed removal only. Even these works also get delayed and are generally carried out from November to January. [Weed removal takes place after seed formation and hence, vegetation again sprouts next year]
- (6) In the old projects like Nira and Bhandardara, major work involved is strengthening of - and repairs to - cross drainage works, road bridges, cross regulators and head regulators.
- (7) Projects in BC soil areas and or in heavy rainfall zones need much more M & R efforts, particularly for distributaries and minors and hence, significantly increased M & R Grants.

## **5.0 Development of M & R Norms**

### **5.1 Brief review of earlier studies**

#### **5.11 Jakhade Committee**

Ministry of Water Resources (MOWR), Government of India (GOI) had constituted Jakhade Committee in May 1987 to study financial requirements for proper maintenance and management of Irrigation Projects. Govt. of Maharashtra (GOM) in Water Resources Department (WRD) had participated in the deliberations of Jakhade Committee. Recommendations of Jakhade Committee (May 1988) are presented here as Annex-5.

WRD, GOM had that time furnished following information to Jakhade Committee regarding requirements of funds for ideal maintenance,

<b>Project</b>	<b>M &amp; R Expenditure (Rs/ha of cropped area)</b>
Mula	240 = 192 + 25% Supervision Charges <sup>(1)</sup>
Nira RBC	263 = 210 +25% Supervision Charges <sup>(1)</sup>
(1) As a component towards regular establishment	

Even after considering similar information supplied by some other states, Jakhade Committee, ultimately, fell back on the recommendations made by 8<sup>th</sup> Finance Commission (1982-83) and Committee for formulation of norms for O & M charges of LIS (1980) and updated them to the year 1988 by adopting an annual escalation rate of 10%.

## 5.2 Twelfth Finance Commission

Twelfth Finance Commission has accepted the recommendations of MOWR, GOI on M & R Funding of major and medium projects and the views expressed by 11<sup>th</sup> Finance Commission on M & R Funding of M.I. Schemes. Recommendations of 12<sup>th</sup> Finance Commission for M & R Norms (base year 2004-05) are given below:

<b>Irrigation Potential</b>	<b>Major &amp; Medium Projects (Rs./ha)</b>	<b>Minor Projects (Rs./ha)</b>
Utilized	600	300
Unutilized	300	- (ignored as being insignificant)
Note: For special Category States (e.g. hilly ) add 30% extra		

### **5.3 XI Five Year Plan**

Report of the Working Group on Water Resources for the XI Five year Plan (2007-2012) has accepted in toto the recommendations of 12<sup>th</sup> Finance Commission (para 5.12 above). In addition, it has made following three important recommendations of basic nature which would certainly have significant positive impact on irrigation projects, if implemented.

- a. A separate budget head up to 15% of Plan Fund may be provided as Irrigation Maintenance Fund (IMF) and full amount of irrigation revenue as collected should be credited to IMF.
- b. In addition to liabilities of completed projects and provision for on-going & new projects, the State Plan proposals should incorporate provisions for special repairs of existing irrigation systems, dam safety measures, improved water management and water development aspects encompassing survey & investigation, research and development, training and National Hydrology Project.
- c. The existing regional / state level institutions such as WALMIs should be strengthened and brought into mainstream activities for irrigation management improvement.

### **5.2 M & R Norms evolved so far**

Evolution of M & R Norms in Maharashtra is depicted in Table-3. GR/Circulars mentioned in the said Table are also presented in the report as Annex-6 & 7.

Comparison of M & R Norms prevalent in the State since 1981-82 is presented in Table-4. While preparing this table certain



adjustments have been made (Please see the foot notes below the table) to bring the figures of prescribed norms on the same footing. All figures of M & R Norms in this table are now in Rs/ha of irrigation potential excluding establishment charges. Following points emerge from this table:

- (1) From column 9, it may be seen that, increase in norm for the period 1986-90 over that for the period 1981-85 was fairly uniform in all cases; the percentage increase being around 53% (i.e. 10.6% per year).
- (2) From column 13 (which gives increase in norm for the period 2002-03 onwards over that for the period 1986-90) it may be seen that
  - a. In case of World Bank aided project
    - The increase in respect of major projects is negligible.
    - There is drastic reduction in norms in case of Medium & Minor Projects.
    - There was no distinction made between projects with gated spillways & un-gated spillways.
  - b. In case of Other Projects
    - Norms for major projects, both gated and ungated, were increased to the extent of 41% and 25% respectively
    - Norms for medium projects were increased by a very small margin.
    - Norms for minor projects were, in fact, reduced.
  - c. Medium & Minor Projects have been worst sufferers as a result of (a) & (b) above.
  - d. Norms in case of World Bank aided projects over the ten year period (1981 to 1990) were higher than those of Other Projects to the extent of 34%. So also, norms for all three

categories of projects were the same in case of World Bank aided projects.

It is likely that norms prescribed for World Bank aided projects were possibly more in tune with the actual needs of the projects. From this angle as well as considering that, the revised norms prescribed in the year 2002-03 were much on the lower side, there appears to be a strong case to revise the present norms to an appreciable extent on the higher side.

- e. If we extrapolate the norms prescribed for the period 1986-90 at the rate of 10.5% per year over a period of 17 years (1985 to 2002) following picture emerges:

Norms for M & R  
(Rs/ha of potential)  
[Excluding Establishment Charges]

<b>Category</b>	<b>1985 (as per circular)</b>	<b>2002 (extrapolated)</b>
W.B. aided	87	475
Others		
• Gated	64	359
• Ungated	54	295

These figures appear very high when compared with figures of norms prescribed in year 2002 because norms prescribed in the year 2002 had been on the lower side.

- (3) It is possible that, due to non-revision of M & R norms over a period of 17 years and also due to M & R norms as revised in year 2002 being much lower than required level, the condition of projects could have suffered due to provision of insufficient funds for M & R, if funds were strictly regulated as per norms.

### **5.3 Proposed Norms for M & R**

#### **5.31 Necessity**

All irrigation systems are subject to wear and tear and undergo continuous process of deterioration in the normal course. Rainfall, sunshine, wind, misuse by community, operational short comings, negligence on the part of field personnel and other agencies contribute to this process of deterioration. This reduces the efficiency of the system. Maintenance & Repairs (M&R) is, therefore, required to keep the system in optimum working condition so as to run with designed efficiency.

Maintenance is the process, which makes good the damages, wear & tear caused to the system and keep it fit to achieve optimum level of efficiency in a sustainable manner and also increase the life of the project components.

Maintenance consists of activities undertaken to keep the system healthy by timely and periodic upkeep like cleaning & painting of gates and mechanical parts, greasing, servicing, removal of shrubs and vegetation and obstruction to flow of water, etc.

Normal repairs are those which are undertaken to remove defects in the system developed in spite of normal maintenance due to normal wear and tear of the system during operation or which develop due to inadequate maintenance of the system and are of small magnitude.

Timeliness in maintenance is very important as delay in execution leads to deferred maintenance involving more efforts and costs.

Adequate and timely M&R which is, thus, imperative for any irrigation system obviously demand equally adequate and timely funding. Funds for M&R, in turn, depend upon M&R

Norms officially adopted by the State. M&R Norms fixed on practical considerations and revised from time to time are, therefore, of great importance. As already discussed earlier, the revision of M&R Norms is overdue in Maharashtra. An attempt, here, has been made to revise the M&R Norms based on certain rationale and assumptions.

### 5.32 **Rationale and Assumptions**

The rationale behind adequate and timely M&R and appropriate funding for the same is very well articulated in the below given paragraph from Maharashtra State Water Policy.

“.....the Responsible Authorities including River Basin Agencies, WUAs and other Water User Entities and Water Service Providers shall ensure and sustain the performance and function of all water infrastructure and facilities within their jurisdiction, by implementing cost-efficient, timely and technically sound maintenance programmes and manage and allocate funds to ensure that such maintenance programmes are fully and effectively implemented to achieve this objective.”

Recommendations of Jakhade Committee, Twelfth Finance Commission and XI Five Year Plan, as discussed earlier in paragraph 5.1, also substantiate the rationale given by Maharashtra’s State Water Policy.

On this background & rationale, proposed M&R Norms are based on following assumptions, principles and criteria:

- (1) The existing M&R Norms are very much short of felt needs and hence, need to be substantially increased.
- (2) Average M&R Expenditure worked out on the basis of last 10 year’s reported data indicates the minimum amount needed for M&R.

- (3) Head Works of irrigation system play a vital role and are of great importance. Their M&R requirements need to be considered separately.
- (4) Complete canal network in the command area is required to be maintained even if part of command area at times may not get water for some period.
- (5) M&R requirements of old irrigation projects and irrigation projects in hilly areas, high rainfall zones and Black Cotton Soils are significantly more.
- (6) M&R requirements of KT Weirs with and without reservoir backup are significantly different. Moreover, M&R needs of KT weirs are co-related to the surface areas of their gates and not to the area to be served.
- (7) Most of the government's lift irrigation schemes are not completed and hence the actual M&R expenditure along with the annual cost of energy charges are not precisely known. The Government owned lift schemes have been recently initiated in Maharashtra and experience and adequate data for O&M of such schemes is not available. Hence the Canal network of Govt. Lift Irrigation Schemes may be treated at par with canal network of flow irrigation projects. Electricity charges and expenditure on maintenance of pump-house and rising main may be provided for as per actual. It is felt that for the Government lift schemes, project specific Norms to recover actual expenditure may be established. Common Norms for all the schemes may not be justified. The energy charges are likely to vary from scheme to scheme.
- (8) M&R needs of Storage Tanks may be considered similar to that of Head Works.

(9) Proposed M&R Norms may automatically be increased annually by some percentage to be decided by Govt. from time to time till next revision of M&R Norms.

Following paragraphs give details of proposed M&R Norms based on above assumptions, principles and criteria.

### **5.33 Detailed Proposal**

Following two types of M&R Norms are proposed:

(a) Basic Norms

(b) Adjustment for Specific Conditions for

- Age of the project
- Black Cotton Soils
- Hilly Area/High Rainfall Zone

Basic Norms would help to cover general M & R requirements of irrigation projects all over the State. However, these M&R Norms would not be sufficient in case of old projects, projects in BC Soils and hilly area/high rainfall zones as the M&R requirements in such cases are significantly more. Hence, there is a need for adjustment for said specific conditions.

#### **1. Basic Norms**

##### **1.1 Head Works**

Head Works, it is needless to say, is the most important component of the irrigation project as it serves following basic purposes:

- 1) Impounding of water
- 2) Flood Regulation/Moderation
- 3) Regulated delivery of water to canal system and downstream river.

Now, since many years, irrigation projects are being perceived and used more as an infrastructure facility for water sector in general than merely as irrigation projects. Reservoirs of so called irrigation projects have now become

a dependable source for number of important schemes for following purposes:

- 1) Drinking and Domestic Water Supply
- 2) Industrial Water Supply
- 3) Lift Irrigation on the foreshore of the reservoir and on the River down stream side of the dam.

This change from “irrigation only” to multipurpose water supply that too with enhanced “dependability” has certainly, increased the importance of Head Works significantly. The protection and upkeep of the Head Works is, therefore, of vital importance and hence, need to be given higher priority and special attention in respect of its M&R. Related Statistics further substantiates this argument. Table-5 gives Comparison of Water Use for Competitive Purposes from projects selected for the Study. The proportion of non-irrigation, together with lift irrigation use in these projects indicates that nearly 38% of the water use (excluding the evaporation losses) is not dependent on the canal system at all (i.e. the said water use is mostly from reservoir and or river.)

Similar scenario at State Level is presented in Table-6. It can be seen from this table that non-irrigation and lift irrigation water use from reservoir and or river in respect of 54 Major, 182 Medium and 1709 Minor Projects is as much as 50% of the total water use in the year 2005-06 which was a normal year as far as rainfall is considered. It is only to be expected that the said percentage would shoot up in a low rainfall year.

On this background, it is proposed

- To consider M&R requirements of Head Works separately.
- To determine M&R Norm for Head Works in terms of Rs/Mm<sup>3</sup> of design Live Storage as its M&R requirements are directly related to volume of water and not that much to the area to be served for irrigation.
- To allocate funds for Head Works as per the proposed norms in both good & bad years because even in the bad year, water use particularly for non-irrigation would not only be quite significant but even 'critical' due to the dimension of shortage and associated tensions.
- To provide for M&R of gates, additionally as suggested by the Chief Engineer, Mechanical, WRD, Nashik (Please Refer Annex-9).

The Basic M & R Norm for Head Works excluding establishment charges has been determined as per details given in Table-7.

In Table-7, data regarding Design Live Storage and Average Actual Expenditure on Head Works in respect of NRBC, NLBC, Bhandardara, Katepurna and Palkhed Projects is used to determine average cost of M&R/Mm<sup>3</sup>. It works out to Rs. 10,671/Mm<sup>3</sup>. This average cost is inclusive of cost of M&R of the gates for Spillway, Head Regulators, Emergency Gates and arrangement for operating the gates like the hoists, motors, wire ropes, gantry/cranes etc.



Only two projects viz: Palkhed and Katepurna have furnished the data regarding cost of M&R of Gates as given below:

<b>Project</b>	<b>Live Storage (Mm<sup>3</sup>)</b>	<b>Average Actual Expenditure on Gates (Rs.Lakh)</b>
Palkhed	216	7.99
Katepurna	86	1.66
<b>Total</b>	302	9.65
<b>Average Rs.</b>	3196/Mm <sup>3</sup>	

This average cost of Rs. 3196/Mm<sup>3</sup> is deducted from Rs. 10,671/Mm<sup>3</sup> to arrive at Net Cost of M&R of Head Works without gates. It works out to Rs. 7475/Mm<sup>3</sup>. Addition for escalation at 50% is considered due to following:

- Data used is for last 10 years (1997-98 to 2006-07). The proposed norms would be operative earliest from the financial year 2008-09. There would be a further price rise by that time.
- Royalty Charges on soil & stones has now been imposed by Revenue Department and needs to be accounted for.

The Basic M&R Norm for Head Works (excluding gates), thus, works out to Rs. 11,212/-Mm<sup>3</sup>. Say, Rs. 11,000/Mm<sup>3</sup> of design live storage. This norm is excluding establishment charges. In addition, it is proposed to provide separate norm for M&R of Gates as per suggestions by the Chief Engineer, Mechanical, WRD, Nashik (Refer Annex-9); M&R requirements of Gates being important and separate involving lots of other specific considerations.

## 1.2 **Canals**

Canals & distribution network are the arteries of the irrigation projects. They carry not only water but prosperity to the commands. Adequate and timely maintenance & repairs of Canals and Distribution network, inter-alia, make following things possible:

- Flow of design discharge in every reach of canal and up to every last govt. control point.
- Restricting the Conveyance and operational losses within design limits.
- Controlling the water flows as per the schedules prepared for distribution of water to different off-takes.
- Accurate flow measurement and accounting of the scarce Resource.
- Improving the system efficiencies & agricultural productivity.
- Completion of irrigation within planned flow period and thereby reducing the seepage/ transit losses.
- Minimizing the water conflicts in terms of numbers, frequency and severity due to increased timeliness, predictability and reliability in water supply.

In order to achieve the above mentioned desired effects, complete canal network in the command area is required to be maintained every year, even if, part of command area some times may not get water due to various reasons such as shortage in supply, lack of maintenance, breaches in canals etc. for some period.

The prevailing M&R Norms based on Rs/ha of utilized potential (i.e. actual irrigated area) do not really provide incentive to improve the services for increasing the irrigation coverage. It is more appropriate to provide additional funds for maintaining the area where potential is not utilized rather than restricting the provisions. (Refer Table-3).

The M&R of canal network in the area of unutilized potential suffers because of lack of funds. If this continues for a longer period, then the system deteriorates progressively due to deferred maintenance and if not attended, may become completely unserviceable, needing rehabilitation at very high costs.

It is, therefore, high time to switch over to provide M&R Norms in terms of Rs/ha of Culturable Command Area (CCA) in respect of Canals & Distribution Network. Other equally important reasons, in support of this much awaited and long over due change over, are as follows:

- WRD, GOM has now committed itself to supply water equitably to all users/entities in the entire command area based on Water Entitlement proportionate to land ( $m^3/ha$ ) as per not only the State Water Policy but as per the legislation too! MMISF Act, 2005, MMISF Rules, 2006 and MWRRA Act, 2005 have specific provisions in this regard.
- In view of equitable distribution of available water to all, every farmer / WUA is expected to irrigate only some percentage of his/its land in each season. This does mean that the entire canal

network has to be maintained, irrespective of the availability of water. Conjunctive use of surface and ground water and transferable and tradable water rights (as per new the Act) would also necessitate the change.

- From the starting of PIM and turning over of the Operation and Maintenance of system below the minors to the WUAs, it has been a practice to determine water quota, management subsidies and repair grants on CCA basis. In order to avoid confusion and bring in internal consistency, it is advisable to continue to use same concepts / terminology.
- The tertiary system at the level of minors and below would gradually be handed over to the Water Users Associations (WUAs) for Operation and Maintenance. Hence, every year, part of the command will get transferred to the WUAs. Consequently, M&R Grants will also have to be reduced from the budgetary provisions of WRD. M&R Norms based on Rs/ha of CCA would simplify this.

On this background, it is proposed

- To determine M&R Norm for canals in terms of RS/ha of CCA
- To apply “Rs/ha of CCA” norm to Actual Irrigated Area with following details:
  - Actual Irrigated Area as per average of previous 3 years.

- Perennials, Other Perennials and Two Seasonals to be counted once.
  - Area irrigated on wells not to be considered (for detailed argument, please Refer Annex-10)
  - Kharif area to be included in Actual Irrigated Area, only if, the Project Authorities make arrangements to notify the area as per Maharashtra Irrigation Act, 1976 and levy 50% charges for reserving water in the season. In case of projects with command areas in assured rainfall zones, area equal to that of Kharif irrigation potential, (corresponding to kharif seasonals only) may be included in Actual Irrigated Area only for the purpose of applying M&R norms to estimate maximum permissible funding for a project. (For detailed argument please Refer Annex-11)
- To apply 50% of “Rs/ha of CCA” norm to Balance unutilized potential area i.e. [CCA – Actual Irrigated Area]
  - To further allocate amount worked out for M&R of canal network component wise as given below to cater to the requirements of all components of canal network as per their importance and needs.
 

• Main/Branch Canal	40%
• Distributaries	25%
• Minors	35%

The Basic M&R Norm for Canals excluding establishment charges has been determined as per details given in Table-8.

In Table-8, data regarding CCA and Average Actual Expenditure on Canals in respect of NLBC, NRBC, Bhandardara, Katepurna and Palkhed is used to determine average cost of M&R per ha of CCA. It works out to Rs. 256/ha of CCA. Addition for escalation at 50% is considered to account for effect of price rise and Royalty Charges as already discussed earlier under “Head Works”.

The Basic M&R Norm for Canals excluding establishment charges, thus, works out to Rs. 384/ha. of CCA. Say Rs. 380/ha of CCA! This would be applied as given below.

- Rs. 380/ha of Actual Irrigated Area
- Rs.190/ha of Balance Area i.e. [CCA-Actual Irrigation Area]
- Componentwise break-up of total amount as below:
  - Main/Branch Canal 40%
  - Distributaries 25%
  - Minors 35%

### 1.3 **Kolhapur Type Weirs**

Study of KT Weirs has been done on the basis of data collected for 42 KT weirs. Table below gives some details of the selected weirs.

KT Weirs	Numbers	Needles		Remarks
		Wooden	Steel	
With reservoir back-up	34	21	13	Perennial.Filled repeatedly round the year by releases from upstream storage. More expenditure required for handling of needles
Without reservoir back-up	8			8 monthly. Filled only once in a year
<b>Total</b>	<b>42</b>			Kolhapur – 33 Sangli - 7 Satara - 2

Note: Most of these weirs have average gate height in the range 3.25 m. to 4.5 m; very few fall outside this range

From the examination of collected data in respect of 42 KT Weirs, it is seen that the ratio of Average Annual Expenditure on M&R to Permissible Grants as per prevailing norms over a period of last 5 years comes to 2.58. It is, therefore, concluded that the present M&R Norms for KT weirs are too inadequate and hence, need revision. Prevailing norms for KT weirs are given below:

M&R Norms	KT Weir with gate height		Prescribed componentwise break-up
	Upto 2.5 m.	More than 2.5 m	
Rs/ha of Utilized Potential	100	250	Civil structure 25% Gates 75%

It is, however, necessary to point out that M&R Expenditure for KT weirs has no relation with the extent of area irrigated. It would be more rationale to base the M&R Norm for KT weirs “per square meter area of gates” because

- Major portion of M&R cost of a KT weir is incurred on replacement of damaged needles and on

repeated operations of removal and placement of needles.

- M&R Expenditure on repairs of civil works is comparatively much less

(Note: Prevailing criteria of Gate Height becomes redundant if “per square meter area of gates” is accepted)

In Table-9, data regarding Average Annual Expenditure (period: last 5 years) and Total Area of Gates is considered to determine Average M&R cost/square meter of gate area adding 25% for price escalation. The Basic M&R Norms for KT weirs excluding establishment charges, thus, work out to as given below:

- Rs. 2300/sq.meter of gate area for KT weirs with reservoir back-up.
- Rs. 1450/sq.meter of gate area for KT weirs without reservoir backup.

#### **1.4 Govt. Lift Irrigation Schemes**

It is proposed that –

- Electricity charges and maintenance of pump house and rising main may be taken as per actual.
- For canals of Govt. LIS, M&R Norm suggested for canals (Refer Sub paragraph 1.2 of Paragraph 5.33) may be adopted.

#### **1.5 Storage Tanks**

For Storage Tanks it is proposed to adopt M&R Norms suggested for Head Works (Refer: Sub Paragraph 1.1 of Paragraph 5.33)

## **2. Adjustments for Specific Conditions**

In the light of discussions made earlier in this report (Ref. Sub paragraph 5 of Paragraph 5.32 (Rationale & Assumptions) and at the beginning of Paragraph 5.33 (Detailed Proposal), it is



proposed to adopt increase over and above the Basic Norms so as to do adjustment for following specific conditions.

2.1 Age of the Project

<b>Age (Years)</b>	<b>Add only for Head works &amp; Main / Branch Canals</b>
35 to 70	7.5%
Above 70	15%

N.B. If any modernization or rehabilitation of the concerned component has been carried out within last 35 years, then the additional provision indicated above shall not be admissible.

2.2 Black Cotton Soils

(Applicable if dominant soil type in the command of the project is B.C. Soils. Dominant means percentage greater than 50%)

<b>Project</b>	<b>Add in Respect of</b>	<b>Add to Basic Norms worked out as per 1.2 above</b>
Major	Minors only	To the extent of percentage of command area of the project covered by B.C. soil as per Soil Survey.
Medium	Distributories & Minors	100%
Minor	Main/Branch Canal, Distributory & Minors	100%

2.3 Projects situated in hilly areas / high rainfall zone

(Average rainfall > 2000 mm / year)

Add 100% to Basic Norms on all components of the project, that is

- Add 100% to the amount worked out as per [1.1] for Head Works. [Not applicable for masonry/ concrete dam sections.]
- Add 100% to the amount worked out as per [1.2] for Main/Branch Canals, Distributories & Minors.

(N.B. Item 2.2 & 2.3 not applicable to KT Weirs)

### 5.34 Comparison of Proposed & Prevailing Norms

M&R Grants as admissible to the selected projects as per proposed Basic Norms are shown in Table-10.

M&R Grants admissible to the selected projects after applying proposed Specific Adjustments for Age Factor, BC Soils and Hilly Area/High Rainfall zone are given in Table-11.

Comparison of M&R Grants to the projects selected for the Study as per Existing M&R Norms, Demands, Actual Expenditure and Proposed M&R Norms is presented in Table-12.

In order to get a clear picture of impact of proposed M&R Norms on the selected projects together, a short table derived from Table-11 is presented below. It gives percentage share of M&R Grants componentwise.

(Figures in Rs. Lakh)

Head Works	Main/Branch Canal	Distributaries	Minors	Total Canal	Total Project
(1)	(2)	(3)	(4)	(5)=(2)+(3)+(4)	(6)=(1)+(5)
426.19	593	361	704	1658.55	2083.99
-	(36%)	(22%)	(42%)	(100%)	-
(20%)	(29%)	(17%)	(34%)	(80%)	(100%)

Total CCA of all selected projects together is 6.40 L. ha. By dividing row 2 of above table by this CCA, componentwise M&R Norms in terms of Rs/ha of CCA can be obtained as given below in respect of selected projects.

Sr. No.	Component	M&R Norm Rs/ha of CCA
1)	Head Works	67
2)	Canals (2.1+2.2+2.3)	259
	2.1 Main/Branch Canal	93
	2.2 Distributaries	56
	2.3 Minors	110
3)	Total Project (1) + (2)	326

From last row of Table-12, following picture emerges from selected projects together.

**The total amount as per the proposed Norms is –**

- 68% of Average Actual Expenditure
- 2% of Average Demands
- 418% of Average Permissible Amount as per the existing Norms

Therefore, with particular reference to the selected projects, it can be said that the proposed M&R Norms are significantly higher (almost 4 times) than existing M&R Norms and closer to the actual M&R needs assuming that the demands reflect actual needs.

The increase in the M&R costs due to specific adjustments for age, soil, hilly area and high rainfall is about 16% of Basic Norms.

**5.35 Financial Implications of Proposed M&R Norms at State Level**

In Annex-12 an attempt (approximate) has been made to determine Financial Implication of proposed M&R Norms at State Level.

The total amount of Annual M&R Grants at State Level works out to Rs. 2214.60 Million i.e. Rs. 221.46 Crores. On area basis this means an overall M&R Norm of Rs. 370/ha. of CCA.

The amount worked out is approximate. The exact amount of Annual M&R Grants would be somewhat different, if all details regarding the KT Weirs (numbers & gate area), Govt. LIS and Storage Tanks are considered.

This amount is exclusively for M&R works i.e. it does not include Establishment Charges and funds for Special Repairs, Emergency Maintenance and Extension & Improvement of Canals.

## **6. Recommendations**

- 1) Proposed M&R Norms, both Basic Norms & Specific Adjustments, as presented in the Abstract (Annex-8) are recommended.
- 2) Proposed M&R Norms may be increased 10% automatically every year to account for price escalation.
- 3) Budget provision as per proposed M&R norms in any current year may be restricted to the total amount of recovery of water charges in previous year for irrigation as well as non-irrigation; water use for – and water charges of – non-irrigation being significantly increased.
- 4) Budget provision of M&R may be progressively reduced in relation to the area handed over to WUAs. After formation of Project Level Association Grants may be given to the Project Authorities for the M&R of Head Works only.
- 5) In case of some Projects like Jayakwadi and Bhima, which are mega projects with low dependability of replenishment and higher percentage of high water consuming crops, the Norms proposed may result in excessive funding in comparison with the actual requirement. It will be appropriate to examine such cases minutely while making necessary budgetary provision.
- 6) In case of projects, with multiple dams, pick up weirs and large number of canals like Kukadi, Upper Godavari and Jayakwadi, the M&R funds (demands and budget provision) should be worked out for the entire project, that is, for the aggregate live storages of all the reservoirs and pick up weirs, and the total CCA of all the canal systems. The break up of the funds will then be made by the respective controlling officers (i.e. by Superintending Engineer or Chief Engineer) in

tune with the rationale that has gone into evolution of the proposed norms.

- 7) The entire funds admissible as per the Norms should be released at the beginning of the year so as to enable the field officers to start timely repairs as per the schedule of maintenance and repairs based on schedule of operation of the canals. This will reduce the extra costs involved in deferred maintenance.
- 8) The release of funds for M&R should be considered as a fixed liability and therefore an appropriate method of releasing of funds may be made applicable.
- 9) If, releasing the entire amount of funds at the beginning of the year is not possible, the releases should be made in three installments as below and each installment released at the beginning of the period.
  - 1) Period : 1<sup>st</sup> April to 30<sup>th</sup> June 40%  
(release on /before 1<sup>st</sup> April)
  - 2) Period : 1<sup>st</sup> July to 31<sup>st</sup> October 20%  
(release on/ before 1<sup>st</sup> July)
  - 3) Period : 1<sup>st</sup> November to 31<sup>st</sup> March 40%  
(release on/before 1<sup>ST</sup> November)
- 10) In case, if it is not possible to release the funds for as per said installment on due dates due to unavoidable circumstances and large funds are required to be released at the fag end of the year, the project officers may be allowed to deposit the same in the banks. The withdrawals could be permitted after completing the formalities of regular tendering process and planning of the works as per the priorities. The field officers should in that case furnish the utilization certificates by 1<sup>st</sup> week of July, so that the unspent amount would not remain un-utilized for a long period.

11) Computerized system of accounting the Expenditure of the M&R funds should be adopted. The expenditure should be classified at least in the main sub components as shown below:

1) Dam:

(a) Masonry Dam

(b) Earthen Dam

(c) Spillway

(d) Gates (including Hoists, Electrical, Mechanical Installations, Gantry, Stop logs, Motors, Generators) and

(e) Other works like cause way, colonies, office buildings etc.

2) Main/Branch Canals:

(a) Earth work in banks

(b) Lining

(c) Service roads/inspection paths & Road bridges

(d) Water Regulatory Structures like Head/Cross Regulators and Escapes

(e) Cross Drainage works

(f) Measuring devices

(h) Removal of shrubs, trees and other obstructions.

3) Tributaries: Sub items as (2) above.

4) Minors: Sub items as (2) above.

12) There should be some inter locking arrangement to ensure that the classified accounts are maintained. For this purpose, it is recommended that, the bills shall not be cleared for payment, unless the entries are made in the classified Account Books.

13) It is assumed that the proposed Norms would be finally approved by end of August 2008 and communicated to the Project Officers by end of August 2008. The project officers

would be able to frame their demands for inclusion in the Budget 2009-10. Hence, the proposed Norms would be fully operative, earliest from the year 2010-11. The impact of these Norms can be seen from the year 2011-12. Considering that the systems could be well maintained for minimum three years to see the adequacy of the funds as well as to evaluate the impact on increasing the efficiency, equity in supply, increase in the irrigated area and production; the process of revising the M&R Norms can be initiated in April/May 2015. It is hoped that voluminous data/information would be generated, which will take at least 4 to 5 months for analysis and framing Revised Norm structure by end of August 2015-16, to be made operative in the year 2016-17.

## **7. References**

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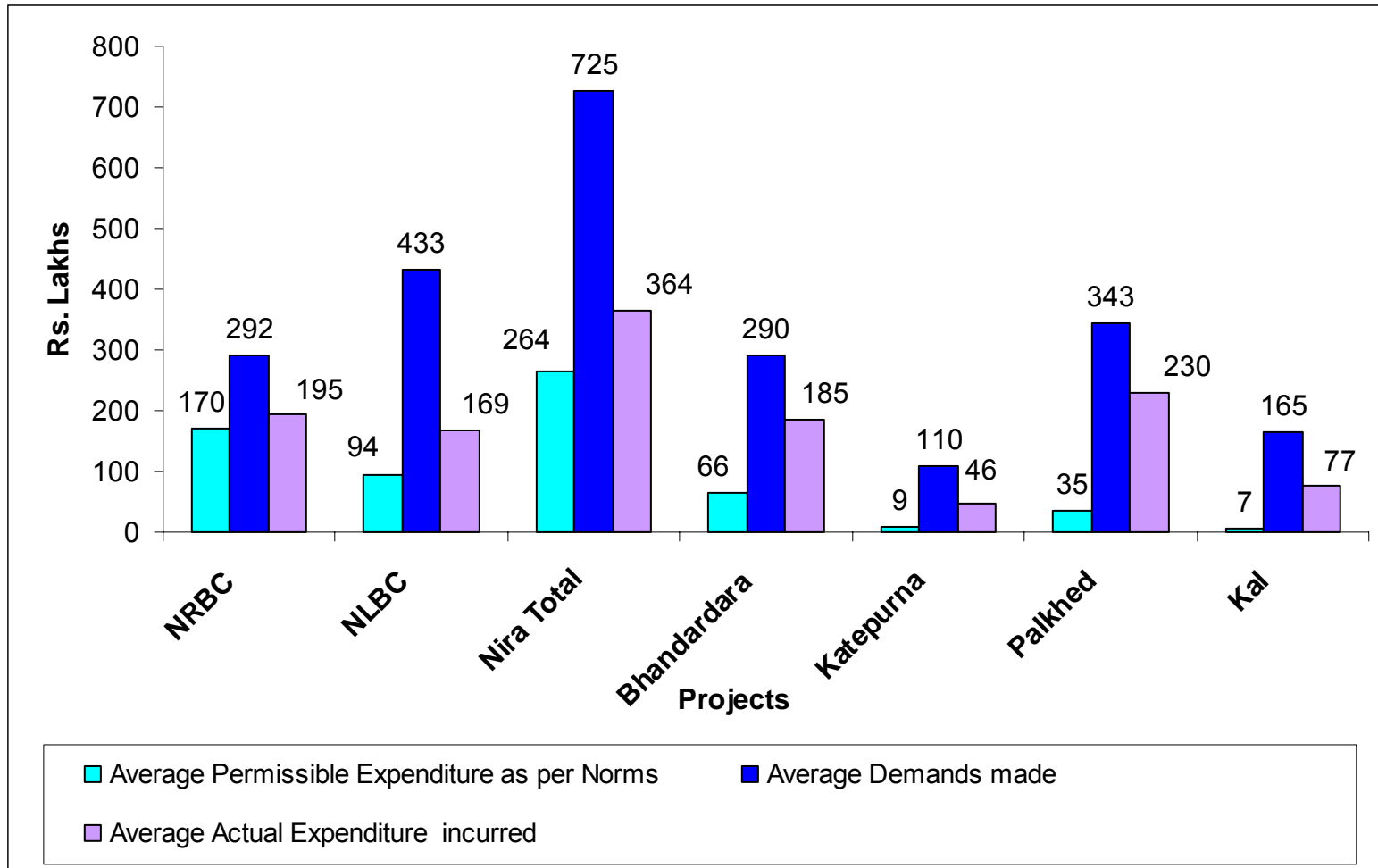


**Table-1 Projects selected for the Study on Revision of M & R Norms**

<b>Sr. No.</b>	<b>Project</b>	<b>Region</b>	<b>Category</b>	<b>CCA (ha)</b>	<b>ICA (ha)</b>	<b>Intensity of Irrigation (%)</b>	<b>Age (Years)</b>	<b>Average Rainfall (mm)</b>	<b>Soil Type</b>	<b>Remarks</b>
1)	Nira	Pune	Major	2,50,033	1,02,575	41	70-80	400	Light/Medium	
2)	Palkhed	North Maharashtra	Major	65,045	44,171	68	27	560	Light/Medium	
3)	Bhandardara	North Maharashtra	Major	63,740	23,077	36	100	700	BC Soil	With d/s pick-up weir
4)	Jayakwadi	Marathwada	Major	2,37,550	1,83,322	77	27	750	BC Soil	
5)	Katepurna	Amravati	Medium	11,187	8,325	74	32	750	BC Soil	With d/s pick-up weir
6)	Kal	Konkan	Medium	9,962	7965	64	34	4000	Murumy	Hilly areas, Gated weir.
7)	Paradgaon	Nagpur	Minor	1133	834	73	27	1124	Medium	Ungated
8)	Takari	Pune	Govt.LIS							Project Incomplete. Hence, not considered
9)	KT Weirs from Kolhapur 33 Satara 2 Sangli 7	Pune	KT weirs <sup>(1)</sup>							
10)	Storage Tanks	Marathwada	5 Storage Tanks	1500				700	Medium	

**(1) With reservoir backup – 34 Numbers, Without reservoir back up – 8 Numbers.**

**Graph No. 1 ( Ref. Table -2)**  
**Project wise Comparison of Permissible Expenditure, Demands & Actual Expenditure**  
**for M&R of selected projects**



**Table-2 Projectwise Comparison of Permissible Expenditure, Demands & Actual Expenditure  
for M&R of selected projects  
(Period : 1997-98 to 2006-07)**

Sr. No.	Projects	Average Permissible Expenditure as per Norms (Rs. Lakh)	Average Demands made (Rs. Lakh)	Average Actual Expenditure incurred <sup>(1)</sup> (Rs. Lakh)	Ratios of		
					Av. Demands to Av. Permissible Expenditure	Av. Demands to Av. Actual Expenditure	Av. Actual Expenditure to Av. Permissible Expenditure
1	NRBC	170	292	195	1.72	1.5	1.15
2	NLBC	94	433	169	4.6	2.56	1.8
	Nira Total	264	725	364	2.75	2.0	1.38
3	Bhandardara	66	290	185	4.4	1.57	4.4
4	Katepurna	9	110	46	12.2	2.4	5.1
5	Palkhed	35	343	230	9.8	1.49	6.57
6	Kal	7	165	77	23.6	2.14	11

Note (1) Actual expenditure incurred is generally same as M & R Funds received.

**Table-3 Evolution of M & R Norms in Maharashtra**

Sr. No.	G.R./Circular	Norms in terms of	World Bank aided projects	All other old & new projects with		Establishment Charges	Prescribed period of application	Remarks
				Gated spillway	Ungated spillway			
1)	GR No. IPM 1078/2183IMG(2) dated 13/7/1981	Rs/ha of Irrigation Potential	80	60	50	30% included	1981-82 to 1984-85 (3 years)	
2)	Circular No IPM-1084/201  Dt. 24/10/1985	Rs/ha of Irrigation Potential	87	64	54	Not included	1985-86 to 1989-90 (4 years)	-In practice made applicable -Conditions apply (see note 1 overleaf)
3)	Circular No. देदुप्र 2001/ (274/2001) सिंव्य. (कामे) Dt.2/7/2002	Rs/ha of Utilized Potential	1) Projects with gated spillway -Major: 200 -Medium: 150 2) Projects with un-gated spillway -Major: 150 - Medium: 125 3) Minor Projects: 100 4) Govt. LIS: 200 5) K.T.Weirs - Gate ht. up to 2.5 m.: 100 - Gate ht. above 2.5 m.: 250 6) Storage tank 40		Not included	From 2/7/2002 till further orders	Conditions apply (see note 2 overleaf)	

## **Evolution of M & R Norms in Maharashtra**

### Notes for Table-3

- 1) Refer Sr. No.2
  1. M & R Norms indicate maximum limit of expenditure
  2. Provisions in budget for M & R shall be within the limits set by recovery of water charges in the previous year.
  
- 2) Refer Sr. No.3
  - 1 Average of actual irrigated area in last 3 years to be considered while working out utilized potential.
    - (1) Actual irrigated area shall consists of area irrigated on Canals, Reservoir, River Streams and Wells.
    - (2) Permissible M & R Grants shall be equal to the minimum amount of following
      - Recovery of irrigation water charges in previous year (excluding recovery of water charges for non-irrigation).
      - Amount worked out based on average of actual irrigated area in last 3 years.
  - M & R Norms indicate maximum limit of expenditure.
  - Wherever WUAs have been established, there would be deduction in M & R Grants.
  - Works such as Earthwork, repairs to gates and electric motors may as far as possible be got done by Mechanical / Electrical Wing of WRD.
  - Expenditure may be done componentwise as indicated in circular.

**Table-4 Comparison of Norms for funding for M & R of Irrigation Projects**

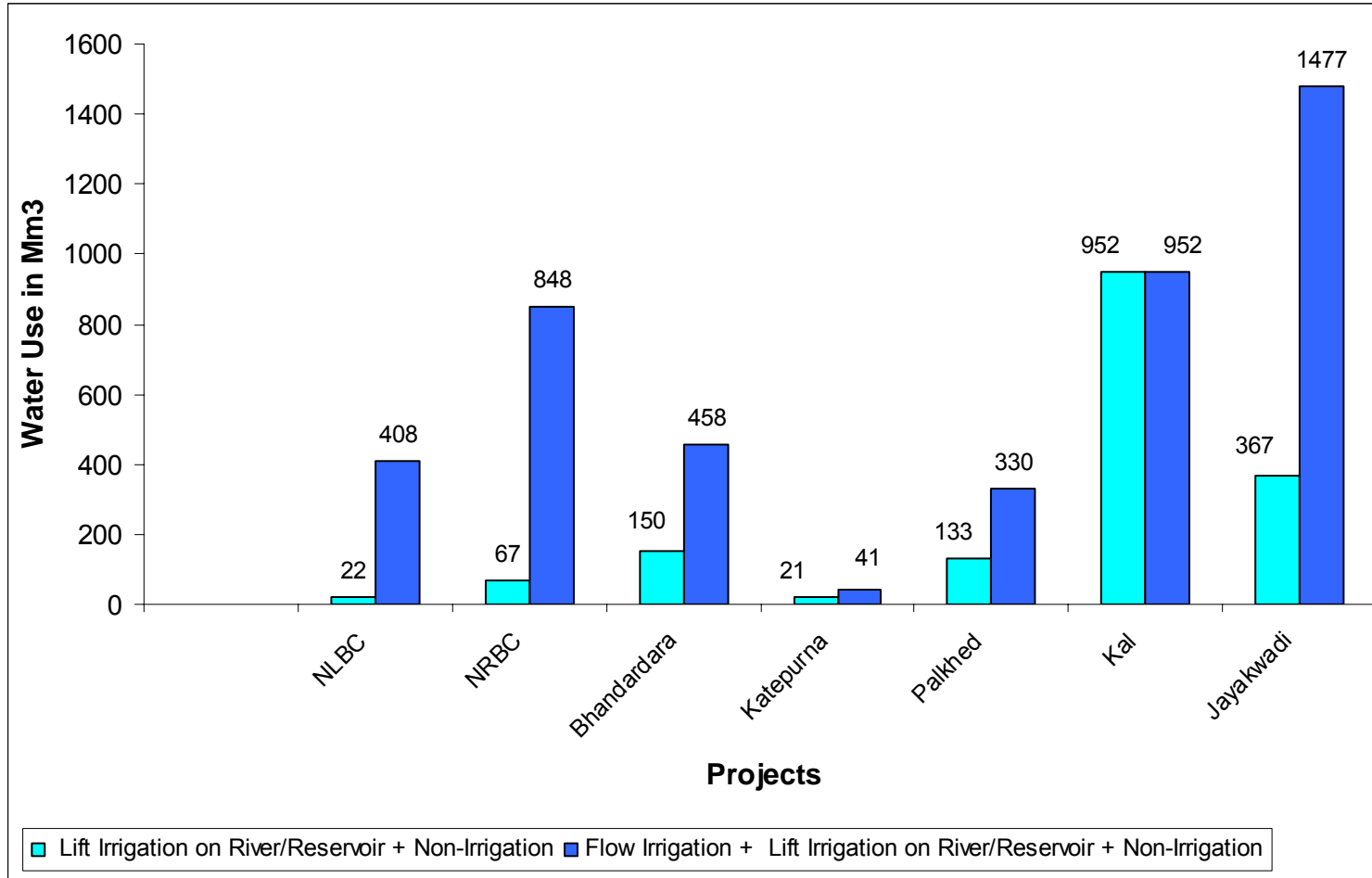
Sr. No.	Type	Years 1981 to 1985			Years 1985 to 1990				Years 2002 -03 onwards				Type	
		Major	Medium	Minor	Major	Medium	Minor	Increase/	Major	Medium	Minor	Increase/		
								%increase				%increase		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	W.B.Aid	56	56	56	87	87	87	31/ 55%	90	67.5	45	3/ 3.45%	Major	
												Reduction	Medium	
												Reduction	Minor	
2	Others													
	Gated	42	42	42	64	64	64	22/ 52%	90	67.5	45	26/41%	Major	
												3.5/ 5.5%	Medium	
												Reduction	Minor	
	Ungated	35	35	35	54	54	54	19/ 54%	67.5	56.25	45	13.5/25%	Major	
													2.25/ 4%	Medium
													Reduction	Minor

- Note: (1) Norms prescribed for the period 1981-85 were inclusive of 30% for Establishment Charges. However, norms for subsequent periods were excluding establishment charges. Hence, the figures of norms for the period 1981-85 have been taken here at 70% of the figures prescribed for the period.
- (2) Whereas norms for the periods 1981-85 and 1986-90 were on the basis of Rs/ha of irrigation potential, the norms for the period from year 2002-03 onwards were on the basis of Rs/ha of utilized potential (i.e. area actually irrigated). To enable comparison, therefore, the figures of norms for the period 2002-03 onwards have been reduced to 45% because utilization of potential has been to the extent of 45% on an average.
- (3) All figures in column 3 to 8 and 10 to 12 are now in Rs./ha of irrigation potential excluding establishment charges.

**Graph - 2 ( Ref: Table 5)**

**Comparison of Water Use for Competitive Purposes from Projects selected for the Study**

**Water use in Mm<sup>3</sup>**



**Table-5 Comparison of Water Use for Competitive Purposes from Projects selected for the Study**

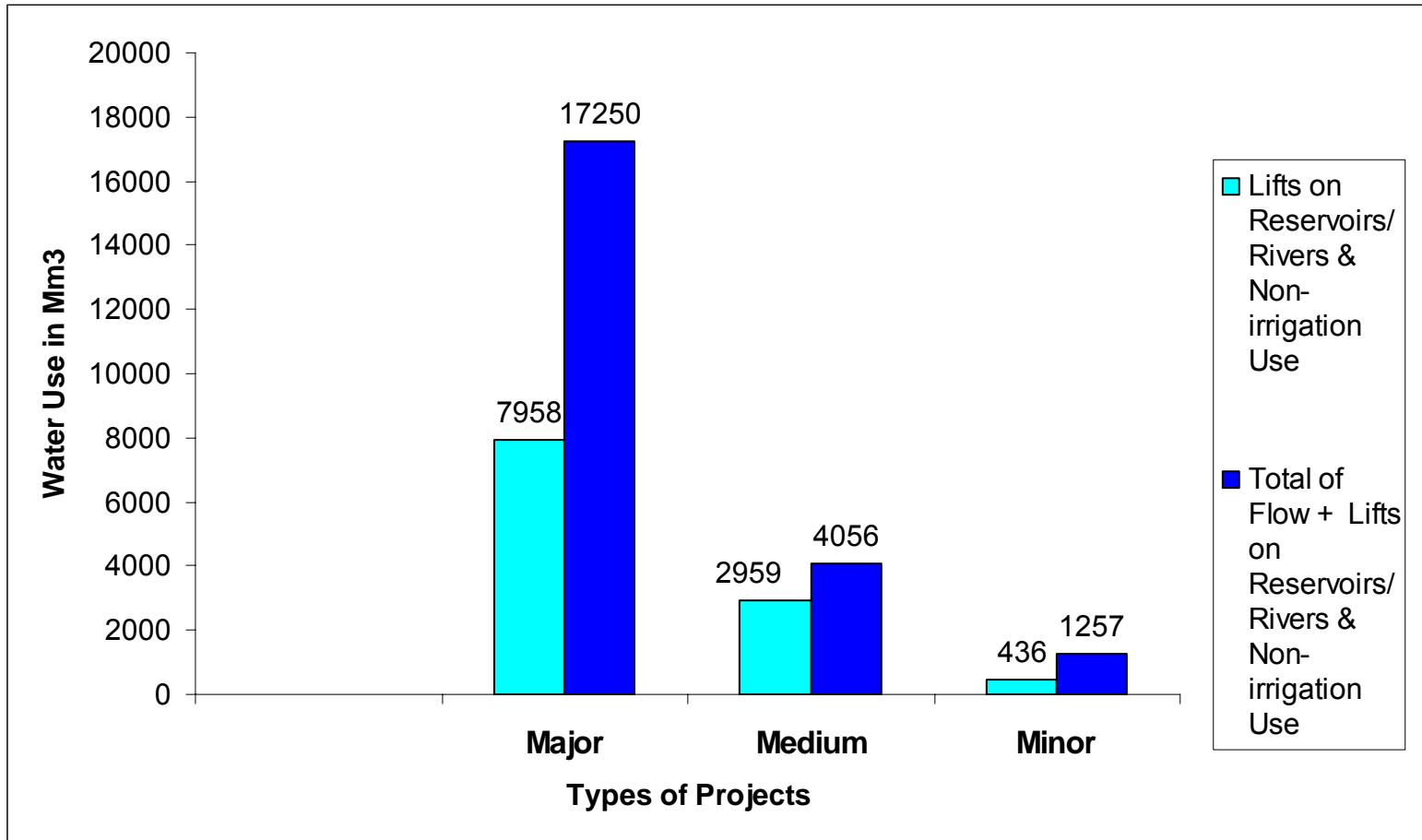
(Water use in Mm<sup>3</sup>)

<b>Sr. No.</b>	<b>Project</b>	<b>Water use for Flow Irrigation (On canals)</b>	<b>Water use for Lift Irrigation on River/Reservoir (Without using canal)</b>	<b>Water use for Non-Irrigation (Without using canal)</b>	<b>Water use Without using canals</b>	<b>Total water use With &amp; without canals</b>	<b>Percentage of water use without canals to total water use</b>
					<b>Col. 4 &amp; 5</b>	<b>Col.3 &amp; 6</b>	<b>% of Col. 6, to Col.7</b>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1)	NLBC	386	10	12	22	408	5
2)	NRBC	781	7	60	67	848	8
3)	Bhandardara	308	74	76	150	458	33
4)	Katepurna	20	2	19	21	41	51
5)	Palkhed/Upper Godavari	197	12	121	133	330	40
6)	Kal	Nil	Nil	952	952	952	100
7)	Jayakwadi	1110	194	173	367	1477	25
	<b>Total</b>	<b>2802</b>	<b>299</b>	<b>1413</b>	<b>1712</b>	<b>4514</b>	<b>38</b>

Source: Report on Water Audit of Irrigation Projects in Maharashtra, 2005-06



**Graph - 3 ( Ref : Table 6)**  
**Comparison of Water Use for Competitive Purposes:**  
**A State Level Scenario**



**Table No-6 Comparison of Water Use for Competitive Purposes:  
A State Level Scenario**

(Water use in Mm<sup>3</sup>)

<b>Type of Project</b>	<b>Water use for Flow Irrigation (On canals)</b>	<b>Water use for Lift Irrigation on River/Reservoir &amp; non irrigation (Without using canal)</b>	<b>Total water use With &amp; without canals Col 3 &amp;4</b>	<b>Percentage of water use without canals to total water use % of Col.3 to Col.4</b>	<b>Remarks</b>
(1)	(2)	(3)	(4)	(5)	(6)
Major	9292	7958	17250	46	
Medium	1097	2959	4056	73	
Minor	821	436	1257	35	
<b>Total</b>	<b>11210</b>	<b>11353</b>	<b>22563</b>	<b>50</b>	

(Refer: Graph-3) Source: Report on Water Audit of Irrigation Projects in Maharashtra, 2005-06

**Table-7 Proposed Basic Norm for M&R Funding of Head Works  
for Irrigation Projects**

<b>Sr. No</b>	<b>Project</b>	<b>CCA (ha)</b>	<b>Live Storage (Mm<sup>3</sup>)</b>	<b>Average Actual expenditure<sup>(1)</sup> on Head Works (Rs. lakhs)</b>	<b>Cost of M&amp;R (Rs. per/Mm<sup>3</sup>)</b>
1	NRBC	181266	266	38	14,286
2	NLBC	68,767	666	27	4,054
3	Total	2,50,033	932	65	6,974
4	Bh'dardara	63,740	304	30	9,868
5	Katepurna	11,187	86	4.41	5,128
6	Palkhed	65,045	216	44.74	20,713
<b>Total</b>		3,90,005	1538	144.15	42,683
Average cost per Mm <sup>3</sup> of live storage					10,671
Deduct cost of M&R of Gates (Rs./Mm <sup>3</sup> )					3,196
Net Cost of M&R of Head Works without Gates					7,475
Add for escalation 50%					3,737
<b>Total Rs.</b>					11,212
<b>Say Rs.</b>					<b>11,000</b>

(1) Period: 1997-98 to 2006-07

**Table-8 Proposed Basic Norm for M&R funding of Canal System  
of Irrigation Projects**

<b>Sr. No</b>	<b>Project</b>	<b>CCA (Ha)</b>	<b>Average<sup>(1)</sup> expenditure on canals (Rs. Lakhs)</b>	<b>Cost (Rs./ha CCA)</b>	<b>Remarks</b>
1	NLBC	68767	142	206	
2	NRBC	181266	157	87	
3	Total Nira	250033	299	120	
4	Bh'dardara	63740	155	243	
5	Katepurna	11187	41.6	372	
6	Palkhed	65045	185	284	
	<b>Total 3 to 6</b>	<b>390005</b>	<b>652</b>	<b>1023</b>	
			<b>Average</b>	256	
			<b>Add escalation 50%</b>	128	
			<b>Total</b>	384	
			<b>Say Rs.</b>	<b>380/ha</b>	

(1) Period: 1997-98 to 2006-07

**Table-9: Proposed Basic Norm for M&R Funding of K.T. Weirs**

<b>KT Weirs</b>	<b>Average annual expenditure* (Rs.lakh)</b>	<b>Total area of gates (Sq.meter)</b>	<b>M&amp;R cost per sq. meter of gate area (Rs./sq.meter)</b>	<b>Remarks</b>
With reservoir back-up				
• Wooden Needles	70.4	3966.41	1766.00	Total 21 KT Weirs
• Steel Needles	72.04	3716.40	1939.00	Total 13 KT weirs
<b>Total</b>	142.44	7682.81	1854.00	Average
	Add 25% for price escalation		463.00	
		Total	2317.50	
		<b>Say</b>	<b>2300/sq.m.</b>	
Without reservoir back-up	8.85	756.20	1170.33	Total 8 KT Weirs
	Add 25% for price escalation		292.58	
		Total	1462.91	
		<b>Say</b>	<b>1450/sq.m.</b>	

Note:

- (1) M&R cost of wooden needles may increase with a faster rate as compared to that of steel needles; availability of wood becoming less/difficult.
- (2) Now a days, steel needles are being used in new KT weirs.

Considering (1) & (2) above, it is proposed to consider use of same M&R Norm for KT Weirs with wooden & steel needles.

\* Period : 2002-03 to 2006-07

\*\* In case of Head works & Canals 50 % escalation has been considered to account for both price escalation & royalty charges on soils & stones. Hence, since the M & R expenditure shall mainly be on gates, only price escalation has been considered. Hence 25 % only

**Table-10 M&R Grants admissible to selected projects as per proposed Basic Norms**

Sr. No	Project	CCA (ha)	Live storage (Mm <sup>3</sup> )	Irrigated Area (ha)	Balance Area (ha)	Basic cost			Total canal (Rs.lakhs)	Canal componentwise Break up		
						Head Works @ Rs 11000/ Mm <sup>3</sup> (Rs. Lakhs)	For Actual Irrigated Area @ Rs.380/ha (Rs. Lakhs)	For Balance Area @ Rs.190/ha (Rs.lakhs)		Main/ Branch 40%	Dy.s 25%	Minors 35%
1	NRBC	181266	266	85912	95354	29	326	nil	326	130	82	114
2	NLBC	68767	666	46,765	22002	73	178	nil	178	71	45	62
3	TOTAL	250033	932	132677	117356	102	504	nil	504	202	126	176
4	Bhandarda ra	63740	304	33000	30740	33	125	nil	125	50	31	44
5	Katepurna	11187	86	3695	7492	9	14	14	28	11	7	10
6	Palkhed	65045	216	13138	51907	24	50	99	149	60	37	52
7	Kal	9962	2	4215	5747	0.2	16	11	27	11	7	9
8	Jayakwadi	237550	2171	50790	186760	239	193	355	548	219	137	192
9	Paradgaon	1133	4	441	692	0.44	2	1	3	1	1	1
10	Storage Tank	1530	5		NIL	0.55						
		<b>640180</b>	<b>3720</b>	<b>237956</b>	<b>400694</b>	<b>408.19</b>	<b>904</b>	<b>480</b>	<b>1384</b>	<b>553</b>	<b>347</b>	<b>483</b>

NOTE

- 1) Irrigated area is considered ONLY FROM canal flow, river lift and reservoir lift. Irrigation on wells is not to be considered.
- 2) In NRBC, NLBC and Bhandardara Projects, the irrigation is stabilized and is more than the ICA. Now, there is practically no scope to increase the irrigation. Hence the difference between the Potential utilized and unutilized is taken as nil. These Projects can get additional grants if irrigated area is increased by saving/ economizing water.

**Table-11 M&R Grants admissible to the selected projects after applying proposed Specific Adjustments for Age factor, BC Soils, Hilly Area and High Rainfall Zone**

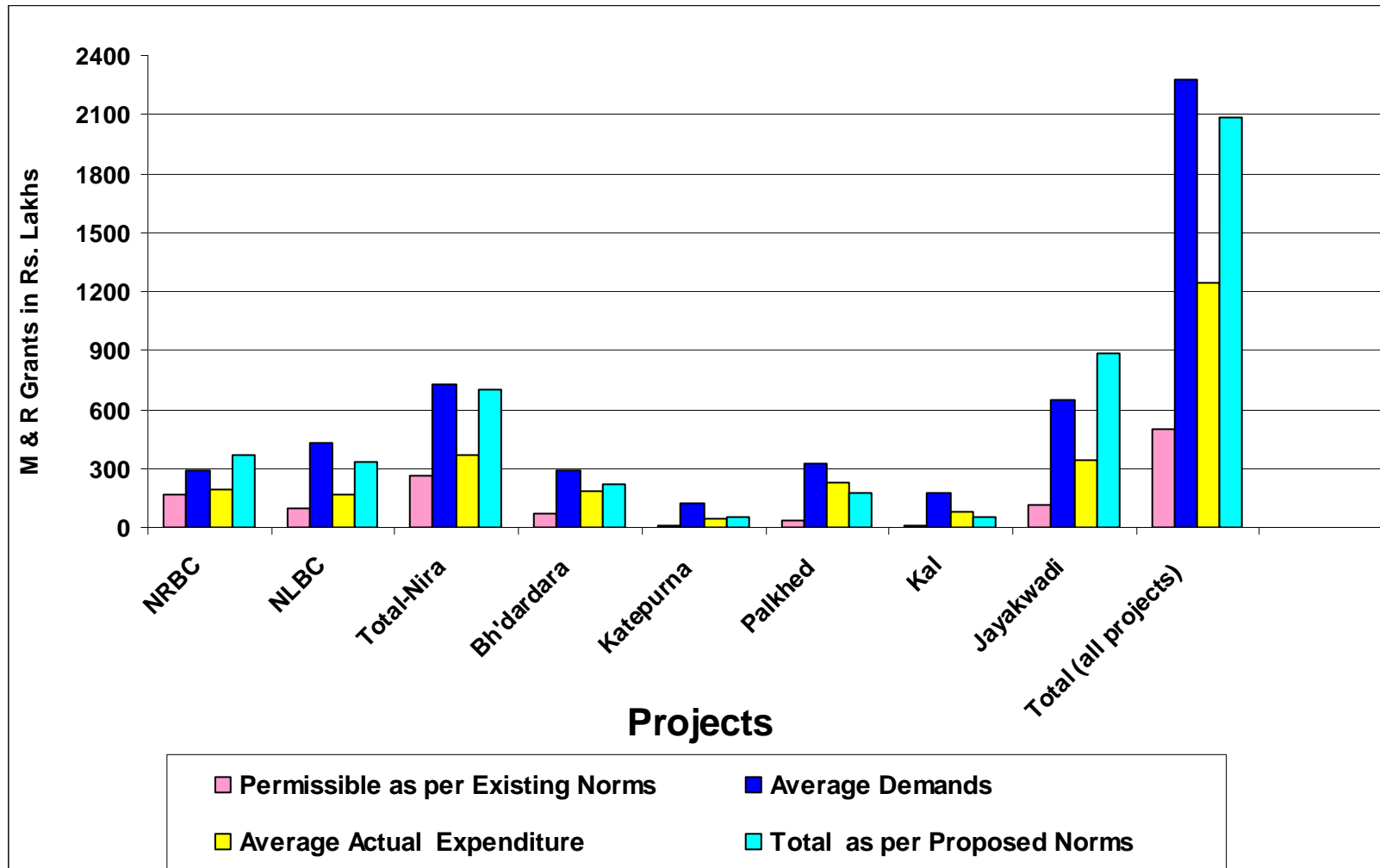
(Rs. Lakh)

Sr. No	Project	CCA (ha)	Live storage (Mm <sup>3</sup> )	Head works		Main/Branch Canal		Distributaries		Minors		Total Canal	Total Project	Remarks
				Basic	Adjusted	Basic	Adjusted	Basic	Adjusted	Basic	Adjusted			
1	NRBC	181266	266	29	31	130	140	82	82	114	114	333	364	7.5% (age)
2	NLBC	68767	666	73	84	71	82	45	45	62	124	252	336	15%( age and B.C Soils)
3	Total	250033	932	102	115	202	222	126	126	176	237	585	700	
4	Bhandardara	63740	304	33	38	50	58	31	32	44	88	178	216	15%( age and B.C Soils)
5	Katepurna	11187	86	9	9	11	11	7	14	10	20	45	54	B.C. Soils
6	Palkhed	65045	216	24	24	60	60	37	37	52	52	149	173	
7	Kal	9962	2	0.2	0.2	11	22	7	14	9	18	54	54	100% on all components (High Rainfall Zone)
8	Jayakwadi	237550	2171	239	239	219	219	137	137	192	288	644	883	B.C. Soils 50%area
9	Paradgaon	1133	4	0.44	0.44	1	1	1	1	1	1	3	3.44	
10	Storage Tanks	1530	5	0.55	0.55	NIL		NIL		NIL		0.55	0.55	
		<b>640180</b>	<b>3634</b>	<b>408.19</b>	<b>426.19</b>	<b>553</b>	<b>593</b>	<b>347</b>	<b>361</b>	<b>483</b>	<b>704</b>	<b>1658.55</b>	<b>2083.99</b>	

- NOTES
- 1) Basic Norms & Specific Adjustments are as per Abstract given in Annex-8. Amounts under columns entitled as "Basic" are taken from Table-10.
  - 2) In Jayakwadi Project B.C. Soils are considered in 50 % area.
  - 3) Provision for M.&R of gates shall be additional as suggested by Chief Engineer, Mechanical, Nashik, which is not included in this table
  - 4) The grants shall be restricted to the recovery of the water fees for Irrigation and Non irrigation.

Graph - 4 ( Ref: Table 12)

Comparison of the M&R Grants to projects selected for the study as per Existing M&R Norms, Demands, Actual Expenditure and the Proposed M&R Norms





**Table-12 Comparison of the M&R Grants to projects selected for the study as per Existing M&R Norms, Demands, Actual Expenditure and the Proposed M&R Norms**

(Refer Graph-4)

Sr. No.	Projects	Permissible as per Existing Norms (Rs. Lakhs)	Average Demands (Rs. Lakhs)	Average Actual Expenditure (Rs. Lakhs)	As per Proposed Norms			Remarks
					Head Works (Rs. Lakhs)	Canals (Rs. Lakhs)	Total (Rs. Lakh)	
1	NRBC	170	292	195	31	333	364	
2	NLBC	94	433	169	84	252	336	
	Total-Nira	264	725	364	115	585	700	
3	Bh'dardara	66	290	185	38	178	216	
4	Katepurna	9	124	46	9	45	54	Medium Project
5	Palkhed	35	321	230	24	149	173	Part of Upper Godavari Project
6	Kal	7	172	77	0.2	54	54.2	
7	Jayakwadi	117	645	338	239	644	883	
8	Paradgao		0.44	1	0.44	3	3.44	Minor Project
9	Storage Tanks	0.55		nil	0.55	-	0.55	Storage Tanks (total 5 nos.)
	Total (all projects)	498.5	2275	1241	426.19	1658.55	2083.99	

Note Norms now proposed are

- 1 Substantially higher than the existing Norms
- 2 Less than demands in case of NLBC, Bhandardara, Katepurna, Palkhed and Kal
- 3 Kal is a different project where main storage is not included and Kal is a pick up weir only  
Need to considered separately as a special case to provide grants for water utilized.

Annex-1  
महाराष्ट्र शासन

जलसंपदा विभाग,  
मंत्रालय, मुंबई ४०० ०३२.  
दिनांक २२/१/२००७

क्रमांक :- संकीर्ण २००७/(१३/२००७)/सिंव्य(कामे)

प्रति,

महासंचालक,  
जल व भूमि व्यवस्थापन संस्था,  
औरंगाबाद

विषय :- पाटबंधारे प्रकल्पांच्या देखभाल दुरुस्तीचे सुधारित मापदंड ठरविण्यासाठी अभ्यास

अध्यक्ष, महाराष्ट्र जलसंपत्ती नियमन प्राधिकरण, मुंबई यांच्या समवेत सचिव (जलसंपदा) व सचिव (लाक्षेवि) यांची दिनांक २९/१२/०६ रोजी बैठक झाली होती. सदर बैठकीत राज्यातील सिंचन प्रकल्पांच्या देखभाल दुरुस्तीचे मापदंड सुधारित करण्याची आवश्यकता प्रतिपादित करण्यात आली. प्राधिकरणाकडून यासाठी राज्यातील प्रत्येक प्रादेशिक विभागातील प्रत्येक संवर्गातील एक-एक प्रकल्प निवडून एखाद्या संस्थेकडून अभ्यास करून घेण्याबद्दल सुचिवण्यात आले.

प्रस्तावित अभ्यास आपल्या संस्थेकडे सोपविण्यात येत आहे. १० ते २५ वर्षांपासून कार्यान्वित असलेले मोठे व मध्यम प्रकल्प खाली दर्शविले आहेत. आवश्यक वाटल्यास आपल्या स्तरावर निवड सुधारित करून पाटबंधारे प्रकल्पांच्या धरण /कालवा/वितरिका या उपांगाच्या वार्षिक देखभाल दुरुस्तीसाठी किती रक्कम आवश्यक आहे याचा अभ्यास करून मापदंड प्रस्तावित करण्याची विनंती आहे. जेणेकरून सदरच्या प्रकल्पांची कार्यक्षमता कायम राखणे शक्य होईल.

अ.क्र.	प्रकल्प संवर्ग	मोठे प्रकल्प	मध्यम प्रकल्प
१.	कोकण	काळ	अंबा
२.	पुणे	निरा (उजवा व डावा कालवा)	सिध्देवाडी
३.	उत्तर महाराष्ट्र	भंडारदरा (प्रवरा)	पांझरा
४.	मराठवाडा	जायकवाडी	कल्याण
५.	नागपूर	बाघ	वेण्णा
६.	अमरावती	काटेपूर्णा	ज्ञानगंगा

को.प.बंधारे व लघु पाटबंधारे प्रकल्पांची निवड आपल्या स्तरावर करावी. निवडलेले प्रकल्प वेगवेगळ्या कालावधीत कार्यान्वित झालेले असावेत. पूर्ण झालेल्या उपसा सिंचन योजना देखील या अनुषंगाने अभ्यासाव्यात.

सदर अभ्यास ३ महिन्यात पूर्ण करण्यात यावा सोबत देखभाल दुरुस्तीचे प्रचलित मापदंड ज्या दि.२/७/००२ च्या शासन परिपत्रकान्वये निर्धारित करण्यात आले आहेत, त्याची प्रत संदर्भासाठी जोडली आहे.

सहपत्र -वरीलप्रमाणे (१)

(प्र.र.देशपांडे)  
शासनाचे अवर  
सचिव

## Pilot Project For Fixing O&M Norms

(Check list identified by MWRRA, Mumbai)

- 1) Name of Project:
- 2) Category : Major/Medium/Minor
- 3) Name of Basin/Sub Basin/Tributary on which project located.
- 4) Type of Project: Storage/Diversion/Lift
- 5) Year of completion & cost
- 6) Design GCA.....Ha/CCA.....Ha/ICA.....Ha.
- 7) Approved cropping pattern: Kharif/Rabi/H.Weather/Two Seasonal/Perennial/  
Total Cropped Area =
- 8) Design Storage /Gross/Live/Dead – Carry over if any
- 9) Whether any reservoir sedimentation survey done? If so, year.
- 10) Revised storage Gross/Live/Dead – Carry over
- 11) Planned utilization in Mm<sup>3</sup>: Irrigation (Kharif/Rabi/H.W.), drinking water/industrial
- 12) Details of canal system:

Length	Capacity	Lined/Unlined
a) LBC..... Km	.....Cumecs	.....length in km.
b) RBC..... Km	.....Cumecs	.....length in km.

- 13) Size of Outlet
- 14) Whether CAD works implemented
- 15) Conjunctive use – No. of wells in command, annual ground water utilization
- 16) No. of farmers, holding size.
- 17) Whether W.U.A. formed – Nos.
- 18) O&M staff sanctioned:

A)	Actual in Position
i) For Headworks	No. Nos.
ii) For Canal & Distributaries	No. Nos.
Regular	No. No.
Work charged	No. No.
Annual Wage Bill in Lakh	Rs. Rs.

19. Last 10 years season wise actual irrigation figures:

Kharif	Rabi	H.W.	Perennial
(.....Ha)	(.....Ha)	(.....Ha)	(.....Ha)

20. Last 10 years season wise irrigation & Non-irrigation water use actual utilization figures:

Kharif	Rabi	H.W.	Perennial
(.....Mm <sup>3</sup> )	(.....Mm <sup>3</sup> )	(.....Mm <sup>3</sup> )	(.....Mm <sup>3</sup> )

Domestic	Industrial
(.....Mm <sup>3</sup> )	(.....Mm <sup>3</sup> )

21. Annual O&M demand separately:
  - A) For Head works
  - B) For Canal & Tributaries
  - C) Allocation in last 10 years for maintenance works & establishment. Allocation per ha. of ICA & per ha. of Potential.
  - D) Allocation made for dam, canal up to minor, canal below minor
  - E) Actual electricity charges in case of pump schemes
22. Last 10 years water tariff levied and revenue collected separately for irrigation and other uses.
23. Details of special repairs carried out in last 10 years – separately:
  - i) For Head Works
  - ii) For Canal & Tributaries
  - iii) Lift Irrigation Scheme Pump Equipment
24. Weather specific repairs suggested by Dam Safety Organization for Head Works have been attended to from time to time? Give yearwise details
25. Any special repair estimate pending implementation
26. General condition of dam, gates, hoist equipment, canal bank work in general (silt, weed growth, damage to lining, rain cuts, canal section geometry in particular, structures (gates, masonry works) (with photographs)
27. Broad assessment of existing water use efficiency vis-à-vis design efficiency. Seepage measurement in selected reaches may be done.
28. O&M allocation requirement as assessed by project authorities.

**Action points identified by WALMI, Aurangabad**  
Study regarding Revision of Norms for M & R of Irrigation Projects  
[RNMRIP]

[Ref: WRD [Marathi]Letter No. *Sankirna* 2007 / (13 / 2007) / *Sin Vya ( Kame)* dt. 22 / 01 / 2007]

**Proposal for RNMRIP Study**

1. WALMI, Aurangabad may do following:
  - Co- ordinate the study
  - Compile & analyze region wise data / information / suggestions from selected irrigation projects /field officers & prepare draft recommendations
  - Organize a workshop of selected field officers to discuss & revise the draft recommendations in the month of March2007 [date & programme to be decided]
  - Submit the recommendations of the workshop to WRD & MWRRA by 31<sup>st</sup> March 2007
2. Regional Chief Engineers may do following:
  - Identify a team of senior engineers in their regions who have the practical experience of Irrigation Management in general and M & R of Irrigation Projects in particular
  - Ask the said team to compile required data / information from selected irrigation projects from their regions & send **region specific** draft recommendations to WALMI, Aurangabad latest by 10<sup>th</sup> March 2007[both hard & soft copies]
3. WRD, GOM may write to CWC, MoWR, WRDs & WALMIs of all States & request them to inform norms for M & R being advocated / practiced by them & make that information available to WALMI
4. Both WALMI & regional teams may carry out literature survey [including browsing on internet]
5. Special emphasis may be given by all concerned on M & R of Regulatory Structures [especially on their gates] & measuring devices considering the vital importance of water level & discharge control in the view of bulk supply on volumetric basis & water entitlements.
6. Out of box thinking & innovative ideas [participatory, technical, financial, administrative, etc]to rationalize M & R expenditure & increase its effectiveness may be encouraged.
7. Likely linkages between M & R grants and performance of the project as indicated by Water Audit & Benchmarking may be specified.
8. Recommendations may be based on considerations like Plan sub group[deficit, normal , abundance, etc], agro-climatic zone, soil type[ BC, Murum, Lateritic, etc] type/nature/size of the project, capacity/type of canal [contour/ ridge/ lined / unlined, etc], dominant crop [paddy for example], specific operational requirements of canal system, closure period, specific man -made problems, region specific natural causes[ vegetation, silting, animals, etc], maintenance problems that arise because of deficiencies in planning /design / construction of dams & canals, aging process, use of machinery, area to be considered[CCA or average irrigated area], availability of water[ normal year, deficit year, etc], components of the project & percent expenditure on those components, automatic increase as per price index, legal commitments, etc, etc
9. Case studies with photos /video films, estimates &component wise actual expenditure may be presented in the proposed workshop by the field officers in support of their felt needs / arguments / recommendations.

Annex-4

A Study by WALMI, Aurangabad for MWRRRA, Mumbai

**Revision of Norms for Maintenance & Repairs  
(M&R) of Irrigation Projects**

Set of Revised Proformae  
(21/02/2008)

## **Revision of Norms for Maintenance & Repairs (M&R) of Irrigation Projects**

### **List of Proformae**

<b>Sr. No.</b>	<b>Proforma</b>
1)	Part-I : General
2)	Part-I: General (a) – Details of Dam & Canal System Data regarding pick-up weir
3)	Part-I: General (b) – O & M Staff
4)	Part-II : Availability and Use of Water
5)	Part-III : Irrigated Areas
6)	Part-III (a): Yearwise Irrigated Areas
7)	Part-IV: Cropping Pattern (a)
8)	Part-IV: Cropping Pattern (b) (No. of rotations & productivity)
9)	Part-V: M & R Funds
10)	Part-VI: M & R Funds – Norms Vs Actual (Years: 2002-03 to 2006-07)
11)	Part-VI (a): M & R Funds – Norms Vs Actual (Years: 1997-98 to 2001-02)
12)	Part-VII: Special Repairs
13)	Part-VIII: Emergency Maintenance
14)	Part-IX: Extension & Improvement
15)	Part-X: Maintenance status of structures on Canal System
16)	Part XI: Status of Measuring Devices (MD)
17)	Part-XII: A comparative statement of DS Rates for major items of M & R of Irrigation Projects
18)	Part-XIII: A technical note regarding Maintenance Status of the project by the concerned S.E.
19)	Part-XIV: Water Tariff



**Revision of Norms for Maintenance & Repairs (M&R) of Irrigation Projects**

**Part-I : General**

1 Select thus (√) the appropriate details

2 Please read points given overleaf while filling the form

1. Project Name:	2. Project Category: Major/Medium/Minor
3. Project Type - Storage / Diversion, - Flow/Lift	4. River basin/subbasin: _____ Tributary <sup>(1)</sup>
5. Region <sup>(2)</sup> :	6. Irrigation Development Corporation <sup>(3)</sup> :
7. Plan sub group <sup>(4)</sup> :	8. Agro-climatic zone <sup>(5)</sup> :
9. Whether project is declared as Eight Monthly Project? : Yes / No , If yes, since -----	
10. Irrigated Agriculture a) Average Land Holding (ha) : _____ b) Average Annual Rainfall (mm): _____ c) Dominant Soil Type <sup>(6)</sup> : _____ Soil Depth(cm) : _____ d) Dominant irrigated crop <sup>(7)</sup> in the Command on canal: _____ e) Night-irrigation: Practiced / Not practiced f) Conjunctive Use <sup>(8)</sup> : Done / Not done g) No. of wells: Total:___ Functional: _____ h) Dominant irrigation method Practiced <sup>(9)</sup> on farm _____ i) Irrigation behaviour <sup>(10)</sup> of average farmers in the command _____ _____ _____	11. Componentwise year of 100 % completion Dam ___ Canal Systems:LBC ___ RBC ___ Distribution System _____ CAD / OFD Works _____ 12. Componentwise completion cost & period of execution (in bracket) Dam ___ ( ), Canal Systems:LBC _____ ( ), RBC _____ ( ) Distribution System _____ ( ) CAD / OFD Works _____ ( ) 13. Field channel lining: _____ (%) 14. Year of commencement of - Water Storage in reservoir _____ - Water Use for Irrigation _____ Non-Irrigation _____ 15. General trend of availability of water for Irrigation <sup>(15)</sup> 16. Water control situation <sup>(11)</sup> : Good/Satisfactory/Not up to mark 17. Approximate present Overall Project Efficiency <sup>(12)</sup> : _____ (%) 18. Notifications Issued as per MIA 76 River ( Sec.11) : Yes / No Command ( Sec 3) : Yes / No Canal officers (Sec. 8) : Yes / No
19. Water Users Associations (No.s) : Required _____ ( ) Formed _____ ( ) (Mention CCA in ha.in bracket) Functional _____ ( ) Successful _____ ( )	
20. Most important factors which adversely affect this project's performance in the context of the M & R of this project <sup>(13)</sup> : _____	
21. Seepage measurement done: Yes / No. If yes, give details <sup>(14)</sup>	

**Points regarding Part-I: General**

- (1) River basin/sub-basins/tributories: as per Maharashtra Water & Irrigation Commission (MWIC) Report, 1999.
- (2) Region: Pune/Nashik/Konkan/Aurangabad/Amravati/Nagpur
- (3) Irrigation Development Corporation: Krishna / Godavari – Marathwada /Vidarbha /Tapi/ Konkan
- (4) Plan sub-group: Highly deficit/deficit/normal/surplus/abundant (as per MWIC Report, 1999)
- (5) Agro climatic zone: Mention applicable Number & Name of Zone.
- (6) Dominant Soil Type

Dominant Soil Type	Command of	
<ul style="list-style-type: none"> <li>- Field capacity</li> <li>- Wilting point</li> <li>- Deficiency, if any, of micro elements (e.g. iron, zinc, etc.)</li> </ul>		

- (7) Dominant irrigated crop: Crop grown on more than 20% of the area irrigated in a particular season.
- (8) Conjunctive Use: Use of Surface and ground water to increase the irrigated area or and to supplement water to the crops grown on canal water, by the ground water, for increasing the frequency of irrigation for the delicate crops, needing water frequently.
- (9) Irrigation method practiced: Border/Furrow: Serpentine or Straight / Basin / Wild Flooding i.e. “Mokat”
- (10) Irrigation behaviour:  
Enthusiastic / Non Enthusiastic; Irrigation minded / non Irrigation minded; Informed / Ad-hoc; Disciplined / Undisciplined; Backward / Progressive
- (11) Water Control Situation: Whether canals and distribution system can be operated/controlled / regulated in professional engineering manner with appropriate water level- & discharge & whether flow measurement can be done.
- (12) Overall project efficiency:

$$OPE = \frac{\text{Vol. of water applied by canal at root zone}^{(+)}}{\text{Vol. of water released from HR of Main Canal}} \times 100$$

(+) as per the consumptive use of all the irrigated crops in the season.

OPE generally assumed at design stage in Maharashtra for open channel system varies from 41% to 48 %. Actual OPE will be much less than that of design OPE because of host of factors.

(13) Factors such as

(a) Deficiencies in the design & construction:

- Absence of pitching or revetments on the slopes of high banks
- Homogeneous Sections adopted for canal banks, leading to heavy leakages & piping
- Presence of very deep black cotton soils due to which the foundation of small structures are being undermined.

(b) Shortage of funds for M & R

(c) Shortage of field level staff for executing repair works

(d) Damages to canal lining due to sudden depletion of water levels or due to swelling soils and non provision of CNS lining

(e) Damages done by the miscreants or the farmers.

(14) Details of seepage measurement in specific canal reaches as available, including when taken & whether any remedial measures were taken thereafter with the results thereof (on separate sheet)

(15) If data of annual inflows for 20 + years is available, then 50% / 75% dependable actual yields be calculated on the basis of that data, and by deducting appropriate figures of sanctions / supply for Non-Irrigation Use. 50% / 75% dependable water availability for irrigation be calculated and this figures compared with corresponding figures in approved / revised project to categorize whether water availability is Adequate or not.

If 20 + years data is not available, then such categorization may be made by comparing figures as calculated from Proforma – Part II.

**Revision of Norms for Maintenance & Repairs (M&R) of Irrigation Projects**

**Part-I General (a)**

**Details of Dam and Canal System**

1. Earth dam:

Length in gorge \_\_\_\_\_ (m), in flanks \_\_\_\_\_ (m)

Average height: in gorge \_\_\_\_\_ (m), in flanks \_\_\_\_\_ (m).

2. Masonary Dam:

Location (Gorge or Flank) \_\_\_\_\_

Length \_\_\_\_\_ (m), Av. Height \_\_\_\_\_ (m)

3. E.D.A. Type: \_\_\_\_\_

4. Spillway: Gated / Ungated \_\_\_\_\_

Type, size and no. of gates, if gated \_\_\_\_\_

5. Outlets / Sluices at Dam.

Type	No.	Size	Discharge Capacity (Cumec/LPS)
Irrigation Outlets			
Scouring sluices			
Power Outlets			

6. Drainage gallery: Length \_\_\_\_\_ (m) Inspection gallery \_\_\_\_\_ (m)

7. Provision of lift in masonry dam: Yes/No.

8. Powerhouse: Yes/No. If yes, installed capacity \_\_\_\_\_ MW

1. Physics of Canal System:

Sr. No.	Channel	Numbers	Capacity at head (cumec)	Total Length (km)	Type of lining (if provided)	Total Length of lined channel (kms)
1.	LBC					
2.	RBC					
3.	Branch canal					
4.	Distributories					
5.	Minors					

Note: Capacity in case of Branch Canals, Distributories and Minors be given as a range, such as for example – 2 cumec to 10 cumec.

**Revision of Norms for Maintenance & Repairs (M&R) of Irrigation Projects**

Project:

Data regarding Pick-up Weirs

1.	Name:	2.	Location:
3.	Year of construction:	4.	Length (m):
5.	Average height (m):	6.	No. of gates:
7.	Gate size:		
8.	Method of operating* gate along with frequency of operation (*whether manually or by machinery like for example moving gantry crane)		
9.	Expenditure on operation of gates and on maintenance & repairs of gates (including on mechanical arrangements for lifting gates, if provided) and the weir structure for last 10 years.		

Expenditure in Rs. Lakh

Sr. No.	Year	Expenditure on		
		Operation of gates	M & R of	
			Gates	Weir Structure
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

A Study by WALMI, Aurangabad for MWRRA, Mumbai  
**Revision of Norms for M & R of Irrigation Projects**  
Part-I General (b) O & M Staff

Total No. of Sections: \_\_\_\_\_

Total No. of Sub Divisions: \_\_\_\_\_

Category of staff	No. of staff members			Annual Wage Bill (Rs. M)		
	As per Norms	Sanctioned	Actual	As per Norms	As per sanctioned	Actual
<u>At Sectional Level</u> a) Head works <u>Regular Staff</u> a 1) a 2) a 3) b) Canal System <u>Regular staff</u> b 1) b 2) <hr/> <u>W.C. &amp; CRT staff</u> 1) 2) 3)						
<u>At Sub-Divisional Level</u> a) Head works a 1) a 2) a 3) b) Canal System <u>Regular staff</u> b 1) b 2) <hr/> <u>W.C. &amp; CRT staff</u> 1) 2) 3)						

- Note:(1) In the selected project there can be more than one maintenance sub division and more than one section under each sub division. Hence, please fill up sum-total of figures all Sections & Sub divisions respectively.  
 (2) After a1), a2), b1), b2), 1), 2) etc. state staff category as for instance, Sectional Officer, Canal Inspector, Measurer, etc.  
 (3) Under " WC & CRT staff ", against each of staff category mentioned under 1), 2), 3), etc. give break-up between Head Works and Canals

A Study by WALMI, Aurangabad for MWRRA, Mumbai  
**Revision of Norms for M & R of Irrigation Projects**  
Part-II : Availability and Use of Water (Mm<sup>3</sup>)

Project \_\_\_\_\_

Sr. No.	Description	As per project report <sup>(1)</sup>	Actual (last 10 years)	
			Average	Range <sup>(3)</sup>
1.0	Total annual inflow - Average - 50% / 75% dependable			
2.0	<u>Storage :</u> (i) Gross (ii) Dead (iii) Effective live <sup>(2)</sup> (iv) Live (on 15th Oct) (v) Carryover (vi) Post Monsoon Flow - from 15/10 to 31/5 - in June - Total (vii) Total (iv) + (vi)			
3.0	<u>Water Use :</u>  (a) Irrigation : Kharif Rabi H.W. Total (a)			
	(b) Non Irrigation : Domestic Industrial Total (b)			
	(c) Evaporation			
	(d) Other measurable losses <sup>(4)</sup>			
	(e) Unmeasured losses <sup>(5)</sup>			
	(f) Water remained unutilized <sup>(6)</sup>			
	<b>Total (a) to (f)</b>			

(1) Latest / Revised report

(2) Considering encroachment due to silt (Pl. give reference/mention basis)

(3) Minimum - Maximum (Note: Please attach yearwise data for last 10 years as supporting statement)

(4), (5): As per Water Audit Proforma

(6) Quantity of water remaining in live storage at the end of Irrigation Year after deducting inflows in June  
(Please give reasons)

A Study by WALMI, Aurangabad for MWRRA, Mumbai  
**Revision of Norms for M & R of Irrigation Projects**  
Part-III : Irrigated Areas (ha)

**Project :**

**Cropped Area <sup>(4)</sup>**

**GCA :**

**CCA:**

**ICA:**

**Irrigation Potential**      -      -

Description	Kharif				Rabi				H.W.				Annual Total (Average)				
	KSIA <sup>(1)</sup>	As per PIP*		Actual*		RSIA <sup>(2)</sup>	As per PIP*		Actual*		HWSIA <sup>(3)</sup>	As per PIP*		Actual*		PIP	Actual
		Av.	Range (Min. to Max.)	Av.	Range (Min. to Max.)		Av.	Range (Min. to Max.)	Av.	Range (Min. to Max.)		Av.	Range (Min. to Max.)	Av.	Range (Min. to Max.)		
<b>Area Irrigated</b>																	
- Canal																	
• Flow																	
• Lift																	
- Reservoir Lift																	
- River Lift																	
- Wells	-	-	-			-	-	-			-	-	-				
<b>Efficiency in ha / Mm<sup>3</sup></b>																	
- Canal																	
• Flow																	
• Lift																	
- Reservoir Lift																	
- River Lift																	
- Wells	-	-	-			-	-	-			-	-	-				

(1) KSIA = Kharif Season irrigable Area = ICA \* Karif Season Irrigated Cropping Intensity

(2) RSIA = Rabi Season irrigable Area = ICA \* Rabi Season Irrigated Cropping Intensity

(3) HWSIA = H.W Season irrigable Area = ICA \* H.W. Season Irrigated Cropping Intensity

(4) Sum of KSIA, RSIA and HWSIA

Note: (1) to (4) above should be as per Approved project report or as per revised irrigation potential

\* For last 10

Pl. give yearwise data as supporting statement





A Study by WALMI, Aurangabad for MWRRA, Mumbai  
**Revision of Norms for M & R of Irrigation Projects**  
Part-IV Cropping Pattern -(a)

Project \_\_\_\_\_

All figures in (%)

Sr.No	Crops	Projecte d	Latest Revised <sup>(1)</sup>	Existing <sup>(2)</sup>	2006- 07 <sup>(3)</sup>	Remark s
1)	Kharif (K)					
	1					
	2					
	3					
	4					
	Sub Total (K)					
2)	TwoSeasonals (TS)					
	1					
	2					
	3					
	Sub Total (TS)					
3)	Rabi ( R )					
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	Sub Total ( R )					
4)	H. W.					
	1					
	2					
	3					
	4					
	Sub Total (HW)					
5)	Perennials (P)					
	1					
	2					
	3					
	4					
	Sub Total (P)					
6)	Total (1) to (5)					

(1) Please mention year

(2) Average of last 3 years

(3) Actual cropping pattern in year 2006-07

(4) If irrigation done spans less than 10 year period, then the actual no. of years overwhich average is given may be mentioned specifically.

Note :

Both irrigated and un-irrigated (UI) crops in the command may be mentioned.

However, UI may be specifically mentioned in Remarks column wherever applicable.

A Study by WALMI, Aurangabad for MWRRA, Mumbai  
**Revision of Norms for M & R of Irrigation Projects**  
Part-IV Cropping Pattern -(b)  
**Project:**

No. of rotations given and productivity

Sr. No.	Crops	Existing Cropping Pattern	Av. No. of rotations given by		Productivity(*) (quintals/ha)
			Canal	Well	

Note: Fill up first 3 columns of this table as per Part-IV (a)

(\*) Please obtain this information from Statistical Officer,  
Agriculture Department

## Revision of Norms for M & R of Irrigation Projects

Part V : M& R Funds ( Rs. In Lakhs)

Project :

CCA: \_\_\_\_\_ ha. ICA: \_\_\_\_\_ ha.

Sr. No.	Description	M & R Funds ( Last 10 years )						Present Status of maintenance <sup>(1)</sup>		
		Demand		Received		Actual Expenditure		I	II	III
		Average	Range	Average	Range	Average	Range			
<b>I</b>	<b>Flow Irrigation:</b>									
	1) Head works <sup>(2)</sup>									
	2) Main Canal									
	3 ) Branch Canal									
	4) Distributories									
	5) Minors & Subminors									
	<b>Total I.</b>									
<b>II</b>	<b>Govt. LIS:</b>									
	1) Barrage / Headworks									
	2) Pumping system									
	3) Actual Electricity charges									
	4 ) Rising main									
	5) Delivery Chamber									
	6) Canal									
	7) Dy. System									
	<b>Total II.</b>									
<b>III</b>	<b>K.T.Weirs</b>									
	1) Weir ( masonry)									
	2) Gates									
	3) Actual Electricity charges									
	4) Others (Pl. Specify)									
<b>Total III.</b>										
<b>IV</b>	<b>Allocation of M &amp; R Funds:</b>									
	* per ha. of CCA									
	* Per ha. of actual area irrigated									

(1) Pl. tickmark (√) appropriate status based on description given overleaf

(2) For the item Headworks [1 (I)], Pl. give breakup regarding Earth Dam, Masonary Dam, Spillway gates & outlet gates, foot of the dam power house in separate supporting statement.

Note: Pl. give yearwise data as supporting statement.

[PTO]

## Present Status of Maintenance

- I : The canals capable of carrying the designed discharge up to the tail ends.
- II : The system capable of providing water to the tail areas in the command
- III : The wastage of water or the seepage losses in the conveyance system are within the designed provisions.

## Revision of Norms for M & R of Irrigation Projects

Part-VI : M & R Funds - Norms Vs. Actual Project :

Sr. No.	Description	Projects with Gated Spillway		Projects with Ungated Spillway		Minor ( MIS)	Govt. LIS	KT Weir		Storage Tank
		Major	Medium	Major	Medium			A <sup>(1)</sup>	B <sup>(2)</sup>	
1	Norm * ( Rs/ha.)	200	150	150	125	100	200	100	250	40
2	Permissible Amount ** ( Rs. Lakhs)	-	-	-	-	-	-	-	-	-
	(1) 02 - 03									
	(2) 03 - 04									
	(3) 04 - 05									
	(4) 05 - 06									
	(5) 06 - 07									
	Average of (1) to (5)									
3	Amount Received ( Rs. Lakhs)	-	-	-	-	-	-	-	-	-
	(1) 02 - 03									
	(2) 03 - 04									
	(3) 04 - 05									
	(4) 05 - 06									
	(5) 06 - 07									
	Average of (1) to (5)									
4	Actual Expenditure ( Rs. Lakhs)	-	-	-	-	-	-	-	-	-
	(1) 02 - 03									
	(2) 03 - 04									
	(3) 04 - 05									
	(4) 05 - 06									
	(5) 06 - 07									
	Average of (1) to (5)									

\* As per Govt. Circular ( Marathi) दे दु प्र २००१ / (२७४ / २००१) सिव्य (कामे) २ . जुलै २००२

\*\* AS per Paragraph 8 & 9 of Govt. Circular mentioned above.[Give break-up in proforma given overleaf]

(1) A = Height of gates up to 2.5 m

(2) Height of gates greater than 2.5 m

[PTO]

A Study by WALMI, Aurangabad for MWRRA, Mumbai

**Revision of Norms for M & R of Irrigation Projects**  
Part-VI M & R Funds

Project: \_\_\_\_\_

Year	Permissible Amount		
	(a)	(b)	(c)
2002-2003			
2003-2004			
2004-2005			
2005-2006			
2006-2007			

(a) As per para 9(a) of Govt. Circular

(b) As per para 9(b) of Govt. Circular

(c) Admissible (i.e. lesser of "as per 9 (a) & 9(b)")

A Study by WALMI , Aurangabad for MWRRA, Mumbai.

## Revision of Norms for M & R of Irrigation Projects

### Part-VI (a) : M & R Funds - Norms Vs. Actual

Project:

Sr. No.	Description	World Bank assisted projects	Projects with gated spillway	Projects with ungated spillway
1	Norm * Rs/ha. of irrigation potential. (excluding establishment)	87	64	54
2	Permissible Amount ( Rs. Lakhs)			
	(1) 1997 - 1998			
	(2) 1998 - 1999			
	(3) 1999 - 2000			
	(4) 2000 - 2001			
	(5) 2001 - 2002			
	Average of (1) to (5)			
3	Amount Received ( Rs. Lakhs)			
	(1) 1997 - 1998			
	(2) 1998 - 1999			
	(3) 1999 - 2000			
	(4) 2000 - 2001			
	(5) 2001 - 2002			
	Average of (1) to (5)			
4	Actual Expenditure ( Rs. Lakhs)			
	(1) 1997 - 1998			
	(2) 1998 - 1999			
	(3) 1999 - 2000			
	(4) 2000 - 2001			
	(5) 2001 - 2002			
	Average of (1) to (5)			

\* शासा परिपत्रक क्र.आयपीएम-१०८४/२०१/पा.प.व.पू.लि. दि. २४ अक्टोबर १९८५







### Revision of Norms for M & R of Irrigation Projects

#### Part IX : Extension & Improvement <sup>(1)</sup>

(as distinct from normal M & R Grants)

Project :

Period: Last 10 years

Sr. No.	Year	Work Done*	Grants (Rs. Lakh)	Expenditure incurred ( Rs. Lakh)

\* Brief Technical description is essentially required.

(1) Extension of the command by extending the main canal & distribution network, construction of additional control and water measuring structures for improving the system, construction of additional facilities like road bridges, improving service road, protective works to improve the safety of the components of the project.

## Revision of Norms for M & R of Irrigation Projects

### Part X : Maintenance Status of Structures on Canal System

**Project:**

Sr. No.	Type of structure	Total Numbers	Condition of Structures			Approximate Cost (Rs.Lakh)	
			Good (No.)	Repairable (No.)	Unservicable (No.)	Repairs	New Construction
1	Head Regulators						
2	Cross Regulators						
3	Escapes						
4	Outlets						
5	Falls						
6	Measuring devices (Pl.specify type) • • • •						
7	C D works (Pl.specify type) • • • •						
8	Bridges (Pl.specify type) • • • •						
9	Miscellaneous (Pl.specify) • • •						
	Total						

Note: Is performance of the project seriously affected due to pending repairs: Yes / No  
If answer is yes, then state in brief, its impact on project performance

A Study by WALMI , Aurangabad for MWRRA, Mumbai.

## Revision of Norms for M & R of Irrigation Projects

Part XI: Status of Measuring Devices (MD)

**Project:**

Sr. No.	Type of M.D.	No. of M.D.				Remarks
		Required	Available	Functioning	Q-table available?	

Total M & R Expenditure on existing MDs in last 5 years (for repairs & calibration both)	-	Rs.	Lakh
Total cost of all proposed MDs	-	Rs.	Lakh



## Revision of Norms for M & R of Irrigation Projects

### Part XIII : A technical note regarding Maintenance Status of the project by concerned Superintending Engineer

#### **Project:**

#### Points to be dealt with

- 1) Componentwise present conditions (health) which should also include major structures on the canal system.
- 2) Present canal capacities with reference to design capacities.
- 3) M & R fund requirements as of today with componentwise break up, also bringing out what portion is included in the same for deferred maintenance.
- 4) So also, based on conditions of various projects under his control, his suggestions on revised norms for M & R funding of different categories of projects with adequate qualitative & quantitative reasoning therefore with a view to improve their performance to a satisfactory level.

Signature: \_\_\_\_\_

Name : \_\_\_\_\_

Designation: Superintending Engineer

Official Address: \_\_\_\_\_

\_\_\_\_\_

Tel.No. (O)

(R)

(M)

A Study by WALMI, Aurangabad for MWRRA, Mumbai  
Revision of Norms for M & R of Irrigation Projects  
Part-XIV: Water Tariff (For last 10 years)

All figures in Rs. Million

Sr. No.	Year	Arrears at the beginning of the year	Assessment during the year	Receipts against arrears	Receipts against assessment of the year	Total Receipts	Normal O&M expenditure	Remarks
I	<b>Irrigation:</b>							
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
II	<b>Non-Irrigation:</b>							
	<b>(a) Drinking</b>							
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
	<b>(b) Industrial</b>							
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
III	<b>Total (I + II)</b>							
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Note:  
 (1) Reference of govt. circulars based on which tariffs have been levied during each year may please be specified in remarks columns.  
 (2) If govt. had waived some of the charges which were under arrears, then copy of that govt. circular along with details of how the arrears have been reduced accordingly in particular years also may be attached separately to this proforma.



**Recommendations of Jakhade Committee, 1988**

(Report of the Committee to study the financial requirements for proper maintenance and management of Irrigation Projects, MoWR, GoI)

(A) Major & Medium Surface Irrigation Projects:

- (a) Rs. 180/ha per annum of gross irrigated area for O & M grant taking the base year as 1988. Out of this, allocation for head works should be to the extent of Rs. 30 to 40 per ha. depending on the type of the head work. While working out the gross irrigated area of any project, the two seasonal and perennials are counted only once along with kharif and rabi crops.
- (b) Rs. 65/- per ha. to Rs. 90/per ha. per annum of C.C.A. for component of regular establishment.
- (c) An amount of at least Rs. 25/- per ha. of the protected area to be provided for maintaining the drainage system in the command area.
- (d) 1/3<sup>rd</sup> of the norms at (a) above. should be provided for unutilized potential.,
- (e) 20% of (a) above should be provided for special repairs over and above the normal maintenance grant as and when required.

(B) Minor Surface Irrigation Schemes:

For minor surface irrigation schemes in hilly areas of Himalayan region, O & M grant should be at least Rs. 900/ha of gross irrigated area including the cost of regular establishment. In addition 20% of the above O & M grant should be provided for special repairs as and when required.

- (a) For hilly regions of the other States the grant may be increased by 30% of A(a) above for the extra requirements of maintenance in such system.

(c) Lift Irrigation Schemes (Inclusive of Electricity Charges and Establishment)

(a)	Lift irrigation schemes by Pumping from river & storages	Rates in Rs. Per ha. of actual irrigation
	Group A up to 0.15 cumec.	770.00
	Group B above 0.15 to 0.75 cumec	620.00
	Group C above 0.75 to 3.00 cumec	500.00
	Group D above 3.00 cumec	475.00
(b)	Lift irrigation from canals:	
	Group A upto 3.00 cumec	550.00
	Group B above 3.00 to 15.00 Cumec	520.00
	Group C above 15 cumec.	500.00
(c)	Irrigation from augmentation tubewells	735.00
(d)	State direct irrigation tubewells	665.00

The O & M grant should be updated annually for the escalation in the costs of labour, material and equipment based on the overall increase in the all India Consumer Price Index.

The Committee Members felt that the recommendations made above are the minimum requirements required for proper maintenance of created assets. No reduction may therefore be effected in the O & M grant as otherwise the systems go in disuse and Plan funds are required to modernize the system. Committee Members further felt that the above recommendations will increase the burden on the states exchequer and desired that suitable measures may be initiated by the State Govts. to supplement the resources of the states through gradual increase in water rates.

Annex-6

**पाटबंधारे प्रकल्पांच्या देखभाल आणि  
दुरुस्तीच्या प्रमाणकांचे पुनर्विरीक्षण**

महाराष्ट्र शासन  
पाटबंधारे विभाग,  
परिपत्रक क्रमांक आयपीएम-१०८४/२०१/पा.प.व.पू.लि.  
मंत्रालय, मुंबई ४०००३२ दिनांक २४ ऑक्टोबर १९८५

पहा: शासन निर्णय क्रमांक आयपीएम १०७८/२१८३ आयएमजी (२) दिनांक १३ जुलै १९८१

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**प्रास्ताविक :-** वरील शासन निर्णयान्वये राज्यातील विविध पाटबंधारे प्रकल्पांच्या दुरुस्ती व देखभाली करता खालील मापदंड ठरविले होते.

- अ) जागतिक बँकेच्या आर्थिक सहाय्य लाभलेल्या सिंचन प्रकल्पांना रुपये ८० प्रति हेक्टर सिंचन क्षमतेसाठी.
- ब) दारासह सांडवे असलेल्या इतर सर्व जुन्या व नव्या सिंचन प्रकल्पांना रु.६० प्रति हेक्टर सिंचन क्षमतेसाठी.
- क) दाराविरहित सांडवे असलेल्या सर्व जुन्या व नव्या सिंचन प्रकल्पांना रु.५० प्रति हेक्टर सिंचन क्षमतेसाठी.

वरील मापदंडात आस्थापनेवरील खर्च ३० (तीस टक्के) अंतर्भूत आहे असे गृहीत धरण्यात यावे असेही ठरविले होते.

२. वरील आदेश दिल्यानंतरच्या काळात झालेली व त्यानंतरही होणारी संभाव्य दर वाढ व आस्थापना खर्च लक्षात घेता व अशा प्रकल्पावर प्रत्यक्ष होणाऱ्या खर्चाचा बारकाईने अभ्यास केल्यानंतर पाटबंधारे प्रकल्पांच्या दुरुस्ती व देखभाली करिता मापदंडात सुधारणा करण्याचा प्रश्न शासनाच्या विचाराधीन होता.

**निर्णय :-** राज्यातील विविध पाटबंधारे योजनांच्या दुरुस्ती व परिक्षण विषयक खर्चाचे दर पुढील पांच वर्षासाठी म्हणजे सन १९८५-८६ पासून ते १९८९-९० पर्यंत खालील प्रमाणे ठरविण्यांत येत आहेत.

- अ) जागतिक बँकेचे आर्थिक सहाय्य लाभलेल्या सिंचन प्रकल्पाकरीता रु.८७ प्रति हेक्टर सिंचन क्षमता (आस्थापना खर्च वगळून)
- ब) दारासह सांडवा असलेल्या इतर सर्व नव्या व जुन्या सिंचन प्रकल्पाकरीता रु.६४ प्रति हेक्टर सिंचन क्षमता (आस्थापना खर्च वगळून)
- क) दाराविरहित सांडवा असलेल्या प्रकल्पाकरीता रु.५४ प्रति हेक्टर सिंचन क्षमता (आस्थापना खर्च वगळून)

वरील परिरक्षण खर्चाच्या मर्यादा ह्या प्रति हेक्टरी जास्तीत जास्त किती खर्च अनुज्ञेय आहे हे दर्शवितात. परंतु क्षेत्रिय अधिकाऱ्यांनी सिंचन यंत्रणा जास्तीत जास्त कार्यक्षम राखण्याचे दृष्टिने अत्यावश्यक

अशीच दुरुस्तीची व परिरक्षणाची कामे हाती घेऊन परिरक्षणावरील खर्च कमीत कमी ठेवण्याचा प्रयत्न करणे आवश्यक आहे.

४. क्षेत्रिय अधिकाऱ्यांनी हे पण लक्षात ठेवणे आवश्यक आहे की, परिरक्षण व दुरुस्ती हयावरील अर्थसंकल्पीय तरतुद ही नजीकच्या वर्षातील केलेल्या पाणी पट्टीच्या राज्यातील वसुलीच्या मर्यादीत राहिल.

हा शासन निर्णय वित्त विभागाच्या सीआर-१२८४/८५/व्यय/६ दिनांक १०.७.८५ अन्वये मिळालेल्या संमतीने निर्गमित करण्यात येत आहे.

महाराष्ट्राचे राज्यपाल यांचे आदेशानुसार व नावांने.

स्वाक्षरीत/-  
(प्र.ग.गोखले)  
शासनाचे अवर सचिव.

## Annex-7

### पाटबंधारे प्रकल्पाच्या देखभाल आणि दुरुस्तीच्या प्रमाणकाचे पुनर्विरीक्षण

महाराष्ट्र शासन  
पाटबंधारे विभाग

शासन परिपत्रक क्रमांक देदुप्र २००१/(२७४/२००१)सिं.व्य.(कामे)

मंत्रालय, मुंबई ४०० ०३२

दिनांक : २ जुलै, २००२.

**पहा -** शासन परिपत्रक पा.वि.क्र.आयपीएम १०८४/२०१/पा.प.व पु.नि.दि.२४.१०.१९८५

### प्रास्ताविक -

वरील शासन परिपत्रकान्वये राज्यातील विविध पाटबंधारे प्रकल्पांच्या दुरुस्ती व देखभालीकरीता खालील मापदंड ठरविले होते.

- अ) जागतिक बँकेचे आर्थिक सहाय्यक लाभलेल्या सिंचन प्रकल्पाकरीता रु.८७ प्रति हेक्टर सिंचन क्षमता (आस्थापना खर्च वगळून)
- ब) दारासह सांडवा असलेल्या इतर सर्व नव्या व जुन्या सिंचन प्रकल्पाकरीता रु.६४ प्रति हेक्टर सिंचन क्षमता (आस्थापना खर्च वगळून)
- क) दाराविरहीत सांडवा असलेल्या प्रकल्पाकरीता रु.५४ प्रति हेक्टर सिंचन क्षमता (आस्थापना खर्च वगळून)

२. वरील आदेश दिल्यानंतरच्या काळात झालेली व त्यानंतरही होणारी संभाव्य दरवाढ लक्षात घेता व अशा प्रकल्पांवर प्रत्यक्ष होणाऱ्या खर्चाचा बारकाईने अभ्यास केल्यानंतर पाटबंधारे प्रकल्पांच्या दुरुस्ती व देखभालीकरीता मापदंडात सुधारणा करण्याचा प्रश्न शासनाच्या विचाराधीन होता.

### निर्णय :-

३. राज्यातील विविध पाटबंधारे योजनांच्या दुरुस्ती व परिक्षण विषयक खर्चाचे दर आस्थापना खर्च वगळून पुढील आदेशापर्यंत खालील प्रमाणे निश्चित करण्यांत येत आहेत.

३.१ द्वारासह सांडवे असलेल्या मोठ्या व मध्यम सिंचन प्रकल्पांकरीता प्रत्यक्ष वापरात येणाऱ्या क्षमतेसाठी

१) मोठे प्रकल्प रुपये: २०० प्रति हेक्टर (प्र.हे.)

२) मध्यम प्रकल्प रुपये: १५० प्र.हे.

३.२ द्वाराविरहित मध्यम व मोठ्या सिंचन प्रकल्पांकरीता प्रत्यक्ष वापरात येणाऱ्या सिंचन क्षमतेसाठी

१) मोठे प्रकल्प रुपये: १५० प्र.हे.

२) मध्यम प्रकल्प रुपये: १२५ प्र.हे.

३.३ शासकीय उपसा सिंचन योजनेवरील प्रत्यक्ष वापरात येणाऱ्या सिंचन क्षमतेसाठी रुपये २०० प्रति हेक्टर

४. या बरोबरच प्रकल्पाचे सर्वच उपांग सुस्थितीत व कार्यान्वित राहण्यासाठी प्राप्त होणाऱ्या देखभाल निधीतून खालील बाबींवर दर्शविलेल्या मर्यादेत खर्च करणे आवश्यक राहिल.

अ) लघु वितरीकेखालील (१ घ.मी.प्र.से.च्या खालील चाऱ्यांसाठी) : -१५ %

ब) मुख्य वितरीका(१ घ.मी.प्र.से. ते ३ घ.मी.प्र.से.)

१) मातीकाम	-	१०	%
२) बांधकाम	-	५	%
३) दरवाजे	-	५	%

-----  
२० %

क) कालवा (उपसा सिंचन योजनेच्या पाईपलाईनसह) ३ घ.मी.प्र.से.पेक्षा जास्त

१) मातीकाम	-	२०	%
२) बांधकाम	-	१०	%
३) दरवाजे	-	५	%

-----  
३५ %

ड) धरण / बंधारा (मातीकाम ड्रेन, पंपहाऊस इ.)----- १५ %

इ) सांडवा, नदी, सरळीकरण, धरणाचे / बंधान्याचे / पंपहाऊसचे दरवाजे रस्ते

व इतर बाबी. १५ %

एकूण १०० %

५. लघु प्रकल्पावरील प्रत्यक्ष वापरात येणाऱ्या सिंचन क्षमतेसाठी रुपये १०० प्रति हेक्टर

धरण	२० टक्के
सांडवा	२० टक्के
कालवा / वितरीका	६० टक्के

६. कोल्हापूर पध्दतीच्या बंधाऱ्यांवरील प्रत्यक्ष वापरात येणाऱ्या सिंचन क्षमतेसाठी

अ) खर्चाचे मापदंड

१) को.प.बंधारा- २.५ मी.दरवाजाच्या उंचीपर्यंत : रुपये १०० प्र.हे.

२) को.प.बंधारा- २.५ मी.पेक्षा जास्त उंचीच्या दरवाजांसाठी : रुपये २५० प्र.हे.

ब) खर्चाचे प्रमाण

१) बंधारा - २५ टक्के

२) दरवाजे - ७५ टक्के

७. साठवण तलावावरील प्रत्यक्ष वापरात येणाऱ्या सिंचन क्षमतेसाठी रुपये ४० प्रति हेक्टर

धरण ५० टक्के

सांडवा ५० टक्के

८. देखभाल व दुरुस्तीसाठी मापदंड प्रत्यक्ष वापरात आणलेल्या सिंचन क्षेत्राच्या मर्यादेतच राहतील.

यासाठी मागील तीन वर्षातील प्रत्यक्षात सिंचित केलेल्या क्षेत्राचे सरासरी क्षेत्र विचारात घेतले जाईल. अशा क्षेत्रात कालवा,जलाशय,नदी नाले व विहिरी यावरून केल्या जाणाऱ्या सिंचन क्षेत्राचा पण अंतर्भाव राहिल. हे सिंचन क्षेत्र म्हणजे पीकक्षेत्र धरण्यांत येईल.

९. सिंचन प्रकल्पांसाठी देखभाल व दुरुस्तीकरीता निधी, खालील दोन्हीपैकी जी रक्कम कमी असेल त्या मर्यादेपर्यंत अनुज्ञेय राहिल.

अ) सिंचन प्रकल्पांची मागील वर्षातील सिंचनाची पाणीपट्टी वसुली (बिगर सिंचन पाणीपट्टी वगळून)

ब) मागील तीन वर्षातील प्रत्यक्ष सिंचित केलेल्या सरासरी क्षेत्रानुसार काढलेला निधी.

१०. हा शासन निर्णय सर्व पाटबंधारे महामंडळातील सर्व सिंचन प्रकल्पांनाही लागू राहिल.

११. ज्या क्षेत्रावर पाणीवापर संस्था स्थापन झालेल्या असतील त्या ठिकाणी निधीत वजावट होईल.

१२. वरील परिरक्षण व दुरुस्तीच्या खर्चाच्या मर्यादा या प्रती हेक्टरी जास्तीत जास्त किती खर्च अनुज्ञेय

आहे ते दर्शवितात. परंतु क्षेत्रिय अधिकाऱ्यांनी सिंचन व्यवस्था जास्तीत जास्त कार्यक्षम राहण्याच्या दृष्टीने अत्यावश्यक अशाच दुरुस्तीची व परिरक्षणाची कामे हाती घेऊन परिरक्षणावरील खर्च कमीत कमी ठेवण्याचा प्रयत्न करणे आवश्यक आहे. प्रकल्पाची सर्व उपांगे (धरण, पाईपलाईन, कालवा, वितरिका इ.) कमीत कमी खर्च करून सुस्थितीत व कार्यान्वित ठेवून जास्तीत जास्त क्षेत्र सिंचित करून त्यावरील पाणीपट्टी वसुली पूर्णतः करणे व शासनाच्या महसूलात भर घालणे हे अपेक्षित आहे. यावरच सिंचनाची परिणामकारकता अवलंबून राहणार

आहे. देखभाल दुरुस्तीची कामे (मातीकाम, दरवाज्याची दुरुस्ती, इलेक्ट्रीक मोटार इ.) ही खात्यातील यांत्रिकी व विद्युत यंत्रणेद्वारे करून घ्यावित. आपत्कालीन स्थितीतच व खात्याची यंत्रसामग्री उपलब्ध न झाल्यासच अन्य प्रकारे नियमाचे आधीन राहून दुरुस्ती करून घेण्याचा प्रयत्न करावा. या यंत्रणेनी खात्यातील उपलब्ध यंत्रसामुग्री मनुष्य शक्तीचा वापर करून अत्यंत काटकसरीने व माफक दरात (अंदाजपत्रकीय ) ही कामे करावीत. कामाची गुणवत्ता उत्तम ठेवावी. अशा परिरक्षण व दुरुस्तीच्या खर्चात शासकीय उपसा सिंचन योजनेच्या विजेच्या खर्चाचाही अंतर्भाव असेल.

१३. परिच्छेद ४ मधील घटकनिहाय ठरवून दिलेल्या खर्चाच्या मर्यादेत बदल करण्याचा अधिकार लघु प्रकल्पाच्या बाबतीत अधीक्षक अभियंता यांना मोठ्या व मध्यम प्रकल्पांच्या बाबतीत मुख्य अभियंता यांना राहिल. असा बदल व्यवस्थित कारणांसह व वस्तुस्थितीस आधारून क्षेत्रिय अधिकाऱ्यांनी प्रस्तावित केल्यास, त्याची छाननी करूनच वरिष्ठ अधिकाऱ्यांनी त्यास मान्यता द्यावी.

१४. हा शासन निर्णय वित्त विभागाच्या अनौपचारिक संदर्भ क्र.३४८/व्यय/१२ दिनांक १०.६.०२ अन्वये मिळालेल्या संमतीने निर्गमित करण्यात येत आहेत.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने.

(दि.मा.मोरे)  
मुख्य अभियंता व सह सचिव



A study of Revision of Maintenance & Repairs Norms  
For State Sector Irrigation Projects in Maharashtra

**Proposed Norms for M & R  
Abstract**

1. **Basic Norms**

2.1 Headworks : Rs. 11,000/Mm<sup>3</sup> of Design Live Storage

- Irrespective of good or bad year
- Provision for M & R of gates shall be additional as suggested by Chief Engineer, Mechanical, Nashik

1.2 Canals: (a) Rs. 380/ha of actual irrigated area

- Actual irrigated area as per average of previous 3 years.
- Perennials, Other Perennials and Two Seasonals counted once.
- Area irrigated on wells not to be considered.
- In a project, if steps for levying 50% of water fees on the kharif crops are taken and guarantee of supply of water provided, the kharif irrigation may be included in the irrigated area.

(b) Rs. 190/ha of balance area

Balance Area = CCA – Actual area irrigated

(c) Total amount worked out as per (a) & (b) above may further be allocated component wise as given below.

- Main/Branch Canal: 40%
- Distributaries : 25%
- Minors : 35%

1.3 K. T. Weirs:

(a) Rs. 2300 / sq. meter of gate area for K.T. Weirs with reservoir backup

(b) Rs.1450/ sq. meter of gate area for K.T. Weirs without reservoir backup

1.4 Govt. LIS:

- (a) Electricity charges & maintenance of pump house & rising main : as per actual
- (b) For canals of LIS : as per Item 1.2 above

1.5 Storage Tanks: as per Headworks ( Refer Item 1.1)

2. **Adjustment for specific conditions**

(i.e. increase over & above basic norms, if and as applicable)

2.1 Age of the Project

<b>Age (Years)</b>	<b>Add for Head works &amp; Main / Branch Canals</b>
35 to 70	7.5%
Above 70	15%

N.B. If any modernization or rehabilitation of the concerned component has been carried out within last 35 years, then the additional provision indicated above shall not be admissible.

2.2 Black Cotton Soils

(Applicable if dominant soil type in the command of the project is B.C. Soils. Dominant means percentage greater than 50%)

<b>Project</b>	<b>Add in respect</b>	<b>Add to Basic Norms worked out as per 1.2 (c) above</b>
Major	Minors only	To the extent of percentage of command area of the project covered by B.C. soil as per Soil Survey.
Medium	Distributories & Minors	100%
Minor	Main /Branch Canal, Distributory Minors	100%

### 2.3 Project situated in hilly areas / high rainfall zone

(Average rainfall > 2000 mm / year)

Add 100% to Basic Norms on all components of the project, that is

- Add 100% to the amount worked out as per [1.1] for Head Works. [Not applicable if dam is fully masonry/ concrete dam]
- Add 100% to the amount worked out as per [1.2(c)] for Main/Branch Canals, Distributories & Minors.

(N.B. Item 2.2 & 2.3 not applicable to KT Weirs)

## प्रपत्र - 'अ'

प्रकल्पावरील जलद्वारांच्या वार्षिक परिरक्षण व किरकोळ दुरुस्ती बाबत करावयाच्या अंदाजपत्रकीय तरतूदीचा तपशील

सन २००८-२००९		तरतूद प्रतिवर्ष प्रति नग (सर्व आकडे रुपयांत)								
		लघु प्रकल्प			मध्यम प्रकल्प			मोठे प्रकल्प		
अ. क्र.	द्वारांचा प्रकार	परिरक्षण	किरकोळ	एकूण	परिरक्षण	किरकोळ दुरुस्ती	एकूण	परिरक्षण	किरकोळ दुरुस्ती	एकूण
१	आपलकालीन द्वार व्यवस्था (उच्चालकासह)	३००००	३५००	३३५००	५००००	६०००	५६०००	६००००	८०००	६८०००
२	सेवाद्वार व्यवस्था (उच्चालकासह)	२५०००	४०००	२९०००	४५०००	५०००	५००००	५००००	६०००	५६०००
३	बायपास व्यवस्था, एअर व्हेंट व्यवस्था, शिड्या इ.	५०००	१०००	६०००	६०००	१५००	६५००	७५००	२५००	१००००

- १) जल द्वारांच्या मोठ्या दुरुस्त्या जसे रबर सी बदलविणे, रालर दुरुस्ती, स्टेमरॉड दुरुस्ती, कव्हर्स नवीन करणे व इतर अनिर्षगिक दुरुस्ती खर्चाचा सदर तरतूदीमध्ये समावेश नाही जलद्वारांच्या निरीक्षणामध्ये ज्या वेळी अश्या प्रकारच्या दुरुस्त्या करणे आवश्यक असल्याबाबत निदर्शनास येईल त्या वेळी तत्कालीन दरसूचीनुसार व दुरुस्तीच्या स्वरूपानुसार अंदाजपत्रक करणे यथोचित होईल.
- २) प्रकल्पावरील ट्रॅश रॅक व्यवस्था, पातनळ व्यवस्था इ. ची परिरक्षण कामे दरवर्षी होत नसल्याने तसेच विविध प्रकल्पावरील सदर प्रकारच्या व्यवस्थेचे परिमाणही भिन्न असल्याने ज्या वेळेस सदर व्यवस्थेचे परिरक्षण व दुरुस्ती कामे करता येणे शक्य आहे त्यावेळेस त्याचे अंदाजपत्रक करणे यथोचित होईल.

मुख्य अभियंता (यांत्रिकी)  
जलसंपदा विभाग, नाशिक-२

## प्रपत्र - 'ब'

## प्रकल्पावरील जलद्वारांच्या वार्षिक परिरक्षण व किरकोळ दुरुस्ती खर्चाबाबत तपशील

अ. क्र.	वक्रद्वारे तपशील	तरतूद प्रतिवर्ष प्रति नग (सर्व आकडे रुपयांत)		
		परिक्षण	किरकोळ दुरुस्ती	एकूण
१	सी.आर. गेटस् (उच्चालकासह)			
	५.५ X ३.५ मी.	१९०००	४०००	२३०००
	५.५ X ४.५ मी.	२००००	४०००	२४०००
२	वक्रद्वारे (उच्चालकासह)			
अ	१२ X ४ मी.	५००००	१५०००	६५०००
ब	१२ X ५ मी.	६००००	२००००	८००००
क	१२ X मी	७००००	२५०००	९५०००
ड	१२ X ८ मी.	७५०००	२५०००	१०००००
इ	१५ X १२ मी.	१२५०००	५००००	१७५०००
३	उभी उचलद्वारे (१५ X ९ मी)	१०००००	५००००	१५००००
४	स्टॉप लॉग द्वारे (१५ X ९ मी)	२५०००	५००००	३००००
५	गोलिण्थ क्रेन्स	५५०००	१००००	६५०००

१) जल द्वारांच्या मोठ्या दुरुस्त्या जसे रबर सी बदलविणे, रालर दुरुस्ती, स्टेमरॉड दुरुस्ती, कव्हर्स नवीन करणे व इतर अनिर्षंगिक दुरुस्ती खर्चाचा सदर तरतुदीमध्ये समावेश नाही जलद्वारांच्या निरीक्षणामध्ये ज्या वेळी अश्या प्रकारच्या दुरुस्त्या करणे आवश्यक असल्याबाबत निदर्शनास येईल त्या वेळी तत्कालीन दरसुचीनुसार व दुरुस्तीच्या स्वरूपानुसार अंदाजपत्रक करणे यथोचित होईल.

२) प्रकल्पावरील ट्रेश रँक व्यवस्था, पातनळ व्यवस्था इ. ची परिरक्षण कामे दरवर्षी होत नसल्याने तसेच विविध प्रकल्पावरील सदर प्रकारच्या व्यवस्थेचे परिमाणही भिन्न असल्याने ज्या वेळेस सदर व्यवस्थेचे परिरक्षण व दुरुस्ती कामे करता येणे शक्य आहे त्यावेळेस त्याचे अंदाजपत्रक करणे यथोचित होईल.

मुख्य अभियंता (यांत्रिकी)  
जलसंपदा विभाग, नाशिक-२

## **Annex-10**

### **Why area irrigated on wells is not to be considered while working out Actual Irrigation Area?**

The wells in the command get most of the water from the seepages and deep percolation of water due to in-efficient method of farm irrigation. The low frequency of water supply and allocation of water without any control on the quantum of water supplied for irrigation, leads to more deep percolation in soils below the root zone. This water is later on available for well irrigation. The farmers can not raise sensitive and delicate crops on low frequency of supply and hence they intentionally try to over-irrigate the crops to recharge water in the ground. However, this requires electric power to pump the water. The State is already short of Power and this type of irrigation leads to overloading the Power Supply, which can be minimized by providing maximum quantum of water to the crops as per the requirement by gravity. The instructions in the Government circular to include the area irrigated in the Potential utilized are perfectly logical, but for in-efficient use of water, providing more grants for Maintenance and Repairs of the canal system does not appear to be correct. Hence, the area irrigated on wells is not considered for the admissibility of M&R funds at the rate of Rs. 380/ha.

## **Annex-11**

### **Conditions for inclusion of Kharif Area in the Actual Irrigated Area**

In case of projects with commands located in assured rainfall zones, area under kharif seasonals does not need irrigation water supply in most of the years due to adequate and timely rainfall in the command area. Therefore the area under the Kharif seasonal crops as per the cropping pattern can be included in the area irrigated. This is particularly true in the regions with very high or assured rainfall areas. In such areas the Irrigation project gives an insurance cover, that if required, the water will be supplied and therefore, the farmers should grow high yielding and high value crops with increased level of fertilizers. The farmers are expected to pay a premium for this by paying 50% water fees as prescribed in the Irrigation Act, 1976.

The farmers, however, have not understood the real meaning of the provision of 50% water fees if water is made available or reserved but not required for the crops due to well distributed and adequate rains. The farmers do not prepare their fields for receiving irrigation and do not apply for water with a view to save the water fees. In the dry spells also they wait for the rains and when the dry spell continues for a longer period, they apply for water on large scale, which is difficult for the WRD to supply simultaneously on a large area. It is seen from the data received, that in the deficit and highly deficit water availability regions also, there is no demand for Kharif crops and the utilization is very less than the potential.

Therefore, in any project, if steps for levying 50% of water fees on the Kharif crops are taken and guarantee of supply of water is provided, the kharif irrigation may be included in the irrigated area. only for the purpose of estimating maximum permissible M&R funding of the project concerned as per M&R norms.

It needs to be mentioned here that, the area equal to Kharif irrigation potential is not included in the Actual Irrigated Area while

working out the fund requirements for M&R of projects selected for the study in the non-availability of adequate information in this regard.

## **Annex-12**

### **Financial implications of proposed M&R Norms at State Level**

(Excluding Establishment Charges, Special Repairs, Emergency Maintenance and Extension & Improvement)

#### **A) Head Works**

- 1) Total Live Storage of Completed State Sector Irrigation Projects (Mm<sup>3</sup>) : 29531
- 2) Basic M&R Norm for Head Works excluding Gates (Rs/Mm<sup>3</sup>) : 11000
- 3) Annual Basic M&R Grants for Head Works excluding Gate (Rs. Million) : 324.8  
(3) = [ (1) \* (2) ]
- 4) Add 30% for M&R of Gates of Head Works (Rs. Million) : 97.44  
(4) = [ (3) \* 0.30 ]
- 5) Annual Basic M&R Grants for Head Works including Gates (Rs. Million) : 422.24  
(5) = [(3) + (4) ]
- 6) Add 16% for adjustments in respect of Age factor, BC soils, Hilly Area/High Rainfall Zone (Rs.Million) : 67.56  
[Note: 16% is the figure arrived at for selected projects. Same is assumed to be applicable at State Level]  
(6) = [(5) \* 0.16]
- 7) Total Annual M&R Grants for Head Works (Rs. Million) (7) = [(5) +(6)] : 489.80



## **B) Canals**

1)	Irrigation Potential Created (L. ha)*	:	41.32
2)	Culturable Command Area (L ha) (41.32 * 1.45)	:	59.91
3)	Area Actually irrigated (L. ha)*	:	18.35
4)	Balance Area (L. ha) (4) = [(2) - (3)]	:	41.56
5)	Basic M&R Norms for Canals	:	
	5(a) : Rs.380/ha of Actual Irrigated Area		
	5(b) : Rs.190/ha of Balance Area		
6)	Annual M&R Grants for Canals (Rs. Million)	:	
	6(a) = (3) * Rs. 380/ha		697.30
	6(b) = (4) * Rs. 190/ha		789.60
	Total 6(a) + 6(b)		1486.90
7)	Add 16% for adjustments (Rs. Million) (Please Refer Note at Sr.No. A-6) [ (7) =Rs.1486.90 * 0.16 ]	:	237.90
8)	Total Annual M&R Grants for Canals (Rs. Million) (7) = Rs. 1486.90+237.90	:	1724.80

\* As per Irrigation Status Report, September 2007

## **C) Project**

Rs. 489.80 (Head Works) + Rs.1724.80 (Canals)	=Rs. 2214.60 Million
	=Rs. 221.46 Crores
	i.e =Rs. 369.65/ha. of CCA Say Rs. 370/ha. of CCA