Government of Maharashtra
Water Resources Department

Godavari Study Group Report

Formulation of Guiding Principles on
Integrated Operation of Reservoirs for Conservation Uses
in Upper Godavari (up to Paithan dam) sub-basin

August 2013

PREFACE

Water, a prime natural resource, is used for multiple uses as domestic, irrigation, industry, power generation navigation etc. Water which was once considered as abundant and has now become a scarce and economic resource. The distribution of water resources is uneven over a large part of the state . The state water policy formulated by Government of Maharashtra in 2003 envisages that the water resources of the state shall be planned, developed, managed with a river basin and sub basin as the unit. This policy states that the distress in water availability during deficit period shall be shared equitably amongst different sectors of water use and also amongst upstream and downstream users.

Upper Godavari Sub-basin includes the entire catchment of the Godavari river from its source to Paithan dam including the catchment areas of the Pravara river, Mula river and that of all other tributaries which falls into the Godavari river in this reach. Large number of major ,medium, minor irrigation projects, K T weirs, local sector schemes are constructed for conservation purposes and utilization of available water resources. This sub basin is a well developed from water storage considerations. However, the factors like rapid urbanization due to high increase in population and faster industrial development are putting stress on available water resources. The development in agriculture and urban sectors has not only posed substantial increase in water demands for various uses, but resulted in conflicts which are critical in nature now itself. The fact that the sub basin water resources remain more or less fixed and demands would go on increasing rapidly. The water management is now a challenge for water resources engineers to adopt a strategy for the integrated operation of reservoirs in the filling period

Government of Maharashtra, Water Resources Department has constituted the Godavari Study Group for formulation of guiding principles on integrated operation of reservoirs in Upper Godavari (up to Paithan dam) sub basin. There is a water stress situation now in this sub-basin. At present, the water resources projects are mostly operated and managed considering them as a single entity, instead of attempting integrated operation for deriving optimum and equitable benefits. The operation of reservoirs based on semi-rigid operation rules, which are developed taking into account the various demands and historic / synthetic time series inflow data, often poses difficulties in making appropriate reservoir release decisions due to uncertainty in the probability of occurrence of inflows. Integrated operation of reservoirs in systems of reservoirs become an operation in real time in which water control decisions have to be taken at each instant of time. The advancement in the field of system engineering and modern computer facilities available now could be effectively used for integrated planning and management of water resources.

Quick report on such important issues is put forth by the study group along with few important recommendations. Possible efforts are made to address on Terms of Reference and peripheral issues. We sincerely hope that the report would be useful to

for integrated water resources management of limited available water resources to meet the increasing demands.

We are thankful to Water Resources Department, Government of Maharashtra for selecting this critical subject for further study. Smt. Malini V Shankar Principal Secretary(WRM&CAD) encouraged study group and whole heartedly participated during discussions. Study Group appreciates Mr. E B Patil Principal Secretary (WRP &D) for his technical guidance and cooperation .We specially acknowledge the contribution made by Mr. V G Kulkarni, Retd Executive Engineer of WRD in collection, validation and analysis of hydrological data.

We are specially thankful to Mr. Jaisingh Hire Asstt Engineer (II), Mr. Deepak Bharne Asstt Engineer (II), Mr. Rajan Lengade Sect Engineer and Mr. Chandrakant Khadkikar Sect Engineer who assisted whole heartedly and very sincerely in preparation of statements, drawings, pie charts, report and related job. We acknowledge the technical support received from Dr A S Garudkar Assistant Professor and Mr.A.B.Nirmale, Assistant Professor. We cannot forget to acknowledge day to day assistance received from Mr. K N Anande, Higher Grade Stenographer, Mr. D M Holkar, Lower Grade Stenographer and Mr.V.R.Hadoltikar, Lower Grade Stenographer.

8 August, 2013

(H.T.Mendhegiri)
Director General,
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Chapter: 1

INTRODUCTION

1.0 General :

Maharashtra State is geographically divided into 5 river basins, namely Godavari, Krishna, Tapi, Narmada, West flowing rivers in Konkan. A river basin is such a hydrological natural unit within the territorial limits of which all activities that are taking place are interdependent. A Sub-basin is a hydrologic sub-unit of a river basin within the State. The River Godavari originates near Trimbakeshwar in Nashik district in Sahyadri hill ranges. It further flows down to Andhra Pradesh after having flowed through Ahmednagar, Aurangabad, Nanded districts and joins the Bay of Bengal near Rajahmundri. The total geographical area of this basin is 312812 Sqkm of which 152811 Sqkm fall within Maharashtra. Second Maharashtra Water & Irrigation Commission (MWIC) has sub-divided Godavari basin into 9 sub-basins in Maharashtra State in the context of planning and regulation of water.

The catchment area of Godavari river upto Paithan dam is designated as Upper Godavari (upto Paithan dam) sub-basin (Drg: 1). Total geographical area of this sub-basin is 21774 Sqkm. Mula, Pravara, Kadwa, Darna, Kaadava, Dodni, Shivna are main tributaries in this sub-basin upstream of Paithan dam. It is mentioned in Second MWIC Report that Upper Godavari sub-basin is a developed sub-basin and it will be necessary in coming times to undertake immediately the work of streamlining the uses on account of water for irrigation, industry and municipal supply. Urban habitation and industrial expansion of Nashik and Aurangabad is dependent on the water of this sub-basin.

2.0 Upper Godavari (upto Paithan dam) sub-basin :

The Upper Godavari Sub-basin includes the entire catchment of the Godavari river from its source to Paithan dam including the catchment areas of the Pravara river, Mula river and that of all other tributaries which falls into the Godavari river in this reach. The Paithan dam is located exactly at the border of the sub-basin. Large number of major, medium, minor irrigation projects, K.T.weirs, local sector schemes are constructed in this sub-basin. The prominent reservoir systems/complex are namely, Mula complex, Pravara complex, Godavari - Darna complex, Gangapur complex, Palkhed complex, Remaining upto Paithan dam and Paithan dam. The Satellite imagery of sub-basin is shown in Fig-1.

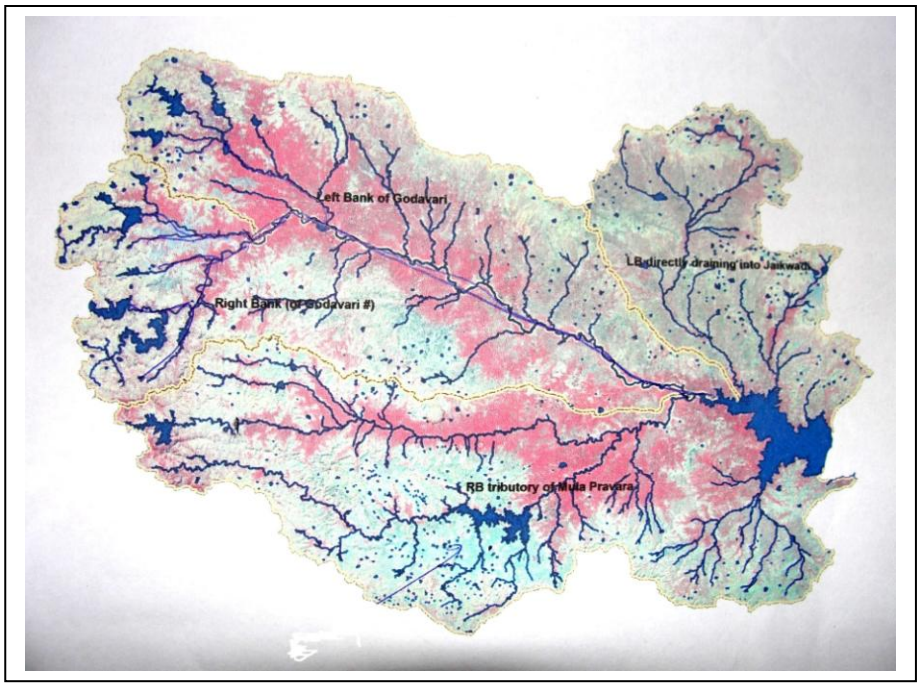


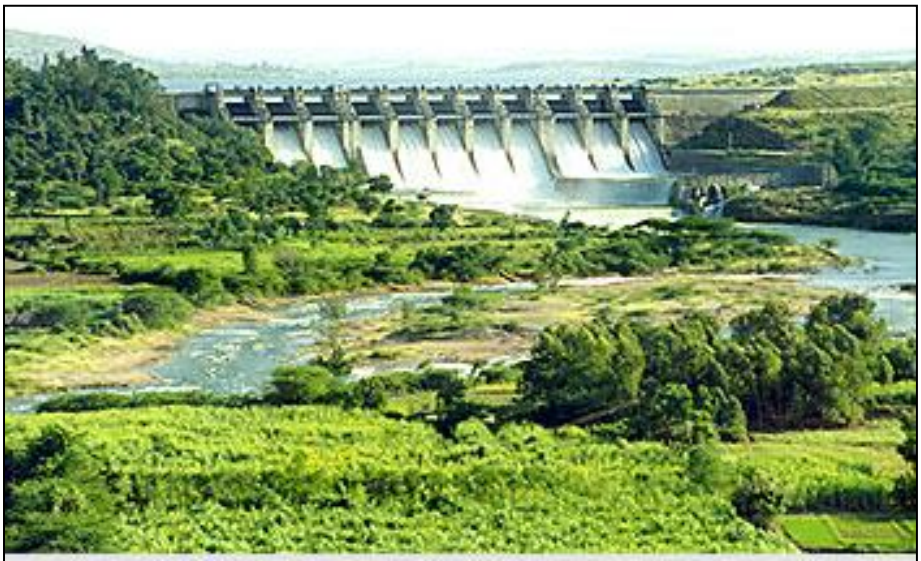
Fig:1 Satellite Imagery of Upper Godavari Sub Basin

The systemwise (complex) details such as name of major & medium projects, number of M.I. projects & K.T. weirs, their storage capacities, irrigation water use, non-irrigation demands, observed yields at various locations etc., are presented in Annexure – 1 to 7. The complexwise water planning aspects are described as under :

2.1 Mula complex :

This complex consists of Mula major project and Mandhol medium project.

Mula Dam: Mula dam is located at Baregaon Nandur, Tal. Rahuri of Ahmednagar district. The dam is constructed across Mula River. Mula Dam is completed in 1971. This project is planned for 70% dependable yield. In planning, the carry over storage of 28.32 Mcum is provided.



Mula Dam in Maharashtra

The irrigable command area (ICA) is 82920 ha.which comprises of :

a)	Mula Right Bank Canal	:	69534 ha.
b)	Mula Left Bank Canal	:	10121 ha.
c)	Wambhori Pipe Chari	:	3015 ha.
d)	Bhagda Pipe Chari		250 ha.
	Total	:	82920 ha.

In the scheme "c & d", water is lifted from reservoir and delivered in percolation tanks and K.T.Weirs through Wambhori and Bhagda Pipe Chari. The cropping pattern of this project is eight monthly having 44% Kharif and 57% Rabi. The design water use from this project is 704.63 Mcum. The sanctioned non-irrigation uses are as under:

a)	Domestic use	:	95.27 Mcum
b)	Industrial use	:	15.09 Mcum
	Total	:	110.36 Mcum

The provision for non-irrigation use in the project planning is 59.12 Mcum.

Mandhol dam : Mandhol medium irrigation project is located near village Karjule Hariya, Taluka Parner of Ahmednagar district, across Mandhol nalla, a

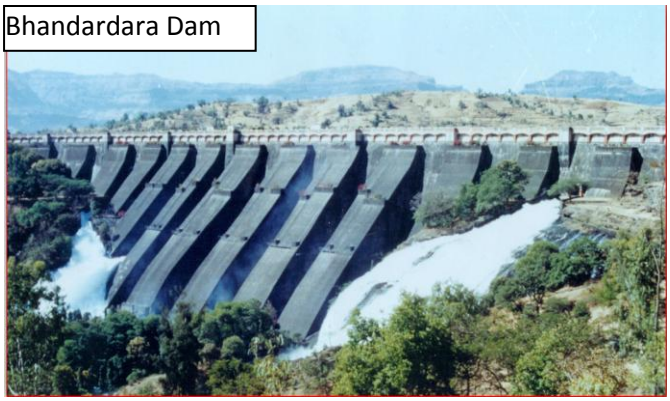
right bank tributary of Mula river. The live storage is 8.78 Mcum. The cropping pattern of the project is 8 monthly. The design water use is 13.15 Mcum.

Besides these projects, there are large number of state and local sector minor irrigation schemes and K.T. weirs located in this complex. The live storage capacities and design water utilizations of these projects are given in Statement-5.

2.2 Pravara complex :

This complex consists of two major dams, namely Bhandardara, Nilwande and two medium projects namely Adhala and Bhojapur.

Bhandardara dam: This dam is completed in 1926 on Pravara river. This project is planned for 75% dependable yield. The water is let out from Bhandardara dam through river to Ozar pick up weir. Ozar pick up weir is constructed in the year 1872. There are two main canals both take off from the pick-up weir namely Pravara Right Bank Canal and Pravara Left Bank Canal.

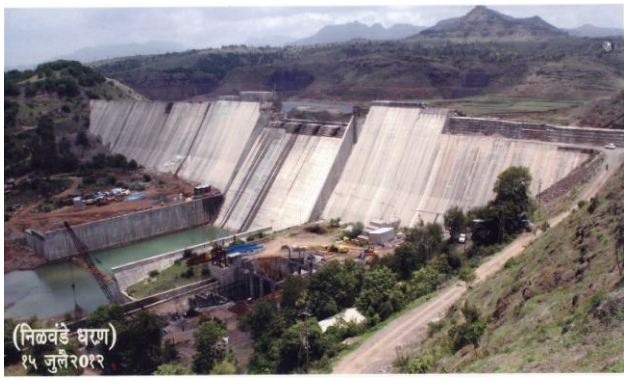


The annual design water use from Bhandardara Project is 434.64 Mcum. The sanctioned non-irrigation uses are as under:

a)	Domestic use		:	43.33 Mcum
b)	Industrial use		:	23.42 Mcum
		Total	:	66.75 Mcum

There is no provision for non-irrigation use in project planning of Bhandardara dam.

Nilwande dam: Nilwande dam is situated on Pravara river 20 Km downstream of Bhandardara dam and upstream of Ozar pick up weir. This dam is located near village Nilwande of Ahmednagar district. There are two canals having length of 85 Km and 97 Km having total irrigable



command area of 64260 Ha. The construction activities were started in 1993 and nearly completed. The project is planned for 50% dependable yield. The design water use from the project is 351.77 Mcum. The project planning provides for non-irrigation (Domestic) use of 13.15 Mcum.

Adhala dam: Adhala is a medium project constructed across river Adhala, tributary of river Pravara, near village Deothan in Akola Taluka of Ahmednagar district. The project was administratively approved in 1966. This project is having its independent command area. The annual design water use of the project is 38.73 Mcum.

Bhojapur dam: Bhojapur is a medium project constructed in 1972-73 on Mahalungi river, tributary of Pravara river near village Sonewadi, Taluka Sinner of Nashik district. The project is planned for 50% dependable yield. The design water utilization is 10.70 Mcum.

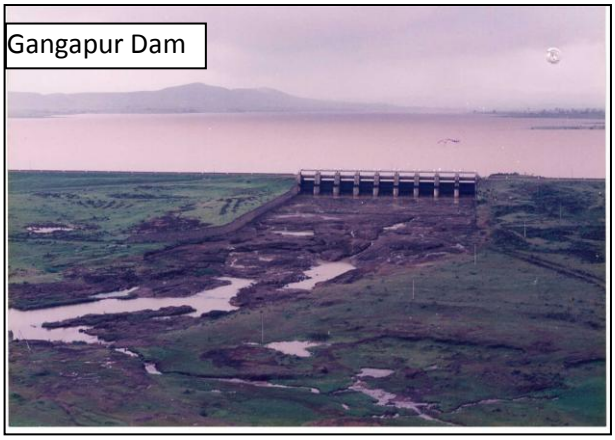
Besides these projects, there are large number of state and local sector minor irrigation schemes and K.T. weirs located in this complex. The live storage capacities and design water utilizations of these projects are given in Statement-5.

2.3 Gangapur complex :

This complex consists of Gangapur major dam and three medium dams, namely (i) Kashyapi (ii) Gautami Godavari (iii) Kikwi

Gangapur dam: A project for constructing dam across river Godavari near village Gangapur, Taluka and District Nashik was sanctioned by Government of Bombay in 1949. The project comprises:

(i) Construction of dam on Godavari river to store 155.75 Mcum (5.5 TMC) of water.
(ii) Construction of Left bank canal to utilize about 104.78 Mcum (3.7 TMC) of water.
(iii) Remodeling of existing Godavari canals to utilize 50.97 Mcum (1.8 TMC) of water.


Gangapur Dam

In the second stage, the storage was increased from 155.75 Mcum (5.5 TMC) to 203.88 Mcum (7.2 TMC) by constructing spillway gates and raising height of dam. The carry over storage of 11.64 Mcum is provided. Additional storage is to be utilized by Nashik Left Bank Canal and newly Nashik R.B.C.

Kashyapi dam: Non-irrigation

use at the time of planning of Gangapur Project was only 2.83 Mcum in original project report. Presently, the Non-irrigation use is increased to 165.96 Mcum annually. So to augment Gangapur storage, the Kashyapi dam having live storage capacity of 51.75 Mcum, was built to stabilize irrigation requirement. This project was administratively approved by Government in 1985. This dam is constructed across river Kashyapi, a left bank tributary of Godavari, near village Dhandegaon in Taluka Nashik of Nashik district. The annual design water utilization is 55.31 Mcum. There is no separate canal system for this project. The project is completed in the year 2006.

Gautami Godavari dam: The purpose of construction of this dam is also to augment Gangapur storage as non-irrigation requirement through Gangapur dam is increased from 2.83 Mcum to 165.96 Mcum. The Gautami-Godavari dam, having live storage capacity of 52.93 Mcum was built in the year 2010 to stabilize the irrigation and non-irrigation requirements of Gangapur dam. The dam is constructed on Godavari river near village Andharwadi which is a part of village Beze, Taluka-Trimbakeshwar of Nashik district. The design water utilization is proposed as 54.68 Mcum. There is no separate canal system for this project.

Kikwi dam: This project is planned in year 2009 against the storage reduction of about 60 Mcum caused by siltation in live storage of Gangapur reservoir. This dam is planned to be constructed across Kikwi River, near village Bramhawade Pimpri, Taluka-Trimbakeshwar of Nashik district. The live storage capacity of this dam is proposed as 60.02 Mcum. The design water utilization as planned is 45.21 Mcum. This project is planned as dedicated storage purely for non-irrigation purpose for Nashik Municipal Corporation. Government of Maharashtra vide Resolution dated 26/8/2009 accorded administrative approval to this project. This project is in initial phase of construction.

In Gangapur complex, the design water use from above four dams (Gangapur, Kashyapi, Gautami and Kikwi) is 324.81 Mcum. The sanctioned non-irrigation uses from the Gangapur complex are as under:

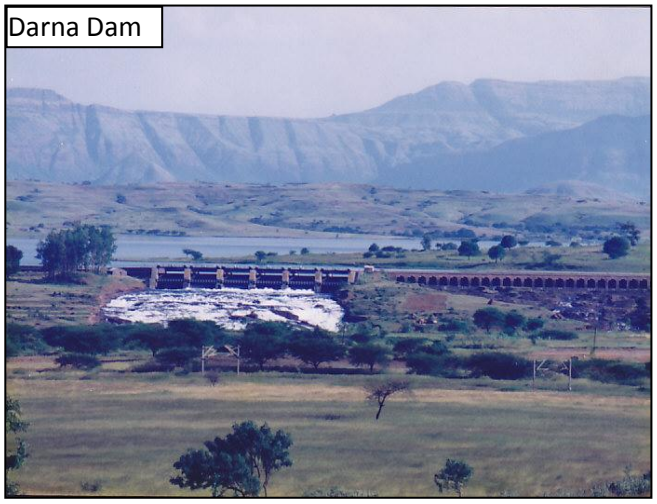
a)	Domestic use		:	131.21 Mcum
b)	Industrial use		:	55.56 Mcum
		Total	:	186.77 Mcum

The provision for non-irrigation uses in the project planning is 36.79 Mcum

Besides these projects, there are large number of state and local sector minor irrigation schemes and K.T. weirs located in this complex. The live storage capacities and design water utilizations of these projects are given in Statement-5.

2.4 Godavari-Darna complex :

Initially, a weir with existing canal system had been constructed just at confluence of river Godavari and Kaadava, upstream of village Nandur Madhameshwar, Taluka Niphad of Nashik district. In the year 1907 to 1916, Canal system known as "Godavari canals" is functioning since then. The system is fed by storage constructed on river Darna, a right bank tributary of Godavari about 76 Km upstream of Nandur Madhameshwar (N.M weir) weir. The Darna dam having live storage of 219.82 Mcum was constructed during the year 1907 to 1916. The canal system is also partly supplemented by Gangapur storage to the extent of 34.27 Mcum and Waldevi medium project to the extent of 16.14 Mcum. To utilize the additional quantum of water available upto N.M. weir, it was necessary to have additional live storage capacities. Four storages are planned on river Darna and its tributaries upstream of N.M. Weir. They are: 1) Bham dam across river Bham, a right bank tributary of Darna near village Kaluste, 2) Bhavali dam across river Darna, just downstream of village Bhavali, 3) Waki dam across river Waki, downstream of village Kurnoli, 4) Mukane dam across Aundha Nalla near village Mukane. All these four dams are situated in Igatpuri Taluka of Nashik district. The water stored in these four storages along with the existing Darna reservoir, partly supplementing from existing Gangapur storage and the runoff from the rivers from unintercepted catchment, will be utilized for the irrigation of existing Godavari RBC and LBC as well as a newly constructed LBC off-taking from N.M. Weir, known as Nandur Madhameshwar express canal. Out of above four new storages, only the Bhavali storage is having independent irrigation of about 1053 Ha. The design water utilizations including newly constructed N.M. express canal of this complex are as under:


Darna Dam

a.	Bham dam	:	8.78 Mcum
b.	Bhavali dam	:	18.64 Mcum
c.	Waki dam	:	12.85 Mcum
d.	Darna dam	:	47.89 Mcum
e.	Mukane dam	:	102.46 Mcum
f.	Godavari canals	:	442.24 Mcum
g.	N.M. Express Canal	:	445.05 Mcum
	Total	:	1077.91 Mcum

Besides above storages/dams, there are three more dams in the catchment upstream of N.M. Weir, namely Kadwa project, Alandi project and Waldevi project. They are having independent canal system. Waldevi project is having its own canal system and also supplementing the water of 16.14 Mcum to Godavari canals.

Kadwa dam: A major irrigation project having storage on Kadwa river, a right bank tributary of Darna river near village Pimpalgaon Dukra, Taluka-Igatpuri of Nashik district with a direct Right bank canal to irrigate 10320 Ha. of land from Igatpuri, Nashik, Sinnar and Niphad Taluka. Live storage capacity is 52.90 Mcum. The dam is completed in the year 1991-92. The design water use of the project is 80.70 Mcum. There is a planning to construct a new dam, called Upper Kadwa, located upstream of the existing Kadwa dam, having design live storage of 13.69 Mcum. However, the works are not yet started.

Waldevi dam: Waldevi is a medium river project constructed across river Waldevi near village Pimplad, Taluka and District Nashik. It is an irrigation cum water supply project to irrigate an area of 1481 Ha. and to supplement water of 16.14 Mcum to Godavari canals and some domestic water supply to MIDC Nashik. Live storage capacity is 32.09 Mcum. The dam is completed in 2003-2004.

Alandi dam: Alandi project is constructed across Alandi river, a left bank tributary of Godavari river near village Sakotiwadi (Davi) in Dindori Taluka of Nashik district. This is a medium irrigation project to irrigate 6296 Ha. of land in Nashik district. Live storage capacity is 27.47 Mcum. The project is administratively approved by Government in 1974. The project is completed in 1982. The annual design water utilization is 40.67 Mcum.

In Godavari-Darna complex, the design water use is 1220.04 Mcum. The sanctioned non-irrigation uses from this complex are as under:

a)	Domestic use	:	92.10 Mcum
b)	Industrial use	:	21.96 Mcum
	Total	:	114.06 Mcum

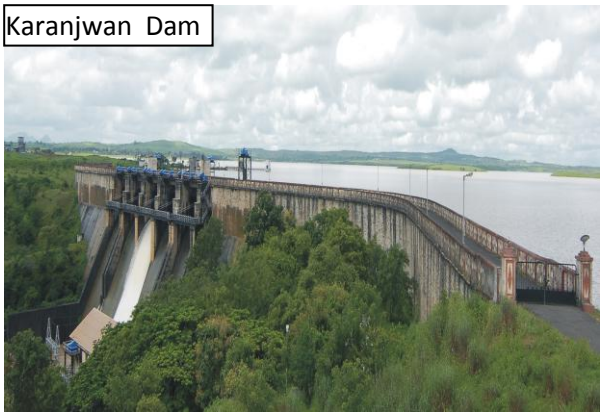
The provision for non-irrigation uses in the project planning is 72.76 Mcum

Besides these projects, there are large number of state and socal sector minor irrigation schemes and K.T. weirs located in this complex. The live storage capacities and design water utilizations of these projects are given in Statement-5.

2.5 Palkhed complex:

Palkhed complex comprises of six dams namely, Karanjwan on Kaadava river, 2) Palkhed on Kaadava river, 3) Waghad on Kolwan river, 4) Punegaon and Ozarkhed on Unanda river, 5) Tisgaon on Parashari river. Kaadava river is a major tributary of river Godavari and Kolwan, Unanda and Parashari are the tributaries of Kaadava river of which Kolwan and Unanda meets river Kaadava U/s of Palkhed dam. Parashari river meets river Kaadava on the D/s of Palkhed dam. All the 6 dams are located in the Dindori Taluka of Nashik district and their command area is spread in Dindori, Niphad, Yeola, Chandwad, Kopargaon and Vaijapur Taluka. Out of 6 dams, Waghad, Karanjwan and Palkhed are designed at 75% dependable yield. The project was originally administratively approved in the year 1966. In original project report, Tisgaon and Punegaon were not part of Upper Godavari project. They were added in the 1st revised administrative approval report.

Karanjwan Dam



As per planning, the water for Palkhed canals is taken from Palkhed dam. Karanjawan & Waghad Dams (apart from their respective use) feed water to Palkhed dam for utilization through Palkhed Right & Left Bank Canals. Ozarkhed canal uses water from Ozarkhed dam & Tisgaon dam through Tisgaon R.B.C. (feeder canal). Tisgaon is a feeder dam to Ozarkhed Left Bank Canal through its 420 meter long Tisgaon Right Bank canal (13th Km of O.L.B.C.). The design water utilization from this complex is 456.52 Mcum.

The sanctioned non-irrigation uses from this complex are as under:

a)	Domestic use	:	27.92 Mcum
b)	Industrial use	:	6.30 Mcum
	Total	:	34.22 Mcum

The provision for non-irrigation uses in the project planning is 20.65 Mcum.

Besides these projects, there are large number of state and local sector minor irrigation schemes and K.T. weirs located in this complex. The live storage capacities and design water utilizations of these projects are given in Statement-5.

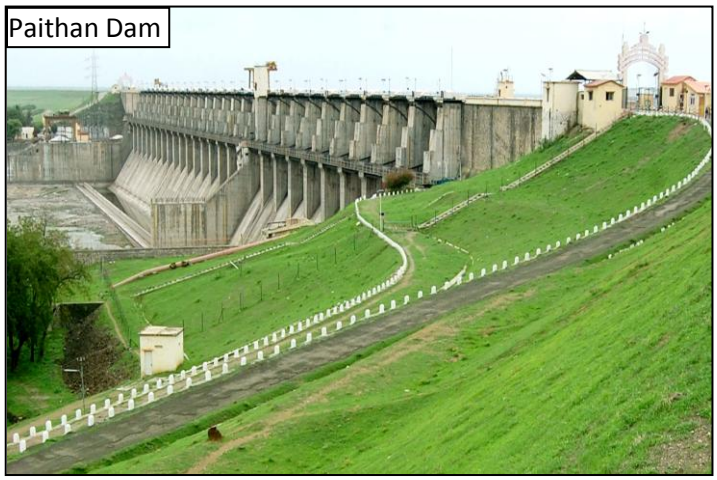
2.6 Remaining upto Paithan dam :

The water utilizations of Projects/Schemes located downstream of Mula dam, Ozar weir, N.M. weir, and upstream of Paithan dam are considered in this complex. There are 7 Medium irrigation projects located in Marathwada region; namely Tembhapuri, Dheku, Kolhi, Narangi, Bor-Dahegaon, Ambadi and Shivana Takli. Besides these projects, there are large number of state and local sector minor irrigation schemes and K.T. weirs located in this complex. The live storage capacities and design water utilizations of these projects are given in Statement-5. The Bramhangavan lift irrigation scheme – II is also planned on backwater of Jayakwadi reservoir as against the old defunct lift irrigation schemes. The water utilization of this scheme is 85.00 Mcum. The administrative approval is given by Godavari Marathwada Irrigation Development Corporation, Aurangabad in the year 2009. The water utilizations of all these schemes are given below:

1.	Seven Medium Projects		- 124.99 Mcum
2.	Bramhangavan Lift Irrigation Scheme – II		- 85.0 Mcum
3.	Minor Projects (State)	(75 Nos.)	- 211.14 Mcum
4.	Minor Projects (local sector)	(172 Nos.)	- 44.00 Mcum
		Total	- 465.13 Mcum

2.7 Paithan dam (Jayakwadi) :

Paithan dam is located on Godavari river at upstream of Paithan town, Dist Aurangabad. This dam is a part of Jayakwadi Project Stage – I. The reservoir created behind the dam is named as "Nathsagar" which has submerged 35000 Ha. of land covering 118 villages. These villages have been shifted and rehabilitated at safe places. This has affected the population of 77000 souls. The design water utilization from this dam is 2618.59 Mcum. The details of Jayakwadi Project are described in Para 3.0 below.



Government of Maharashtra, Water Resources Department vide Memorandum No. IPM/1574/49521/IM-1 (1371) dated 21.6.1978, had allocated water from backwater of Jayakwadi reservoir to the extent of 144.42 Mcum (5.10 TMC) for the Tajanapur (Shevgaon) and Bramhangavan lift irrigation schemes benefitting the project affected/resettled persons.

The water utilizations of lift irrigation schemes on backwater are as under :

1.	Tajanapur Lift Irrigation Scheme – I	: 45.77 Mcum
2.	Tajanapur Lift Irrigation Scheme – II	: 63.977 Mcum
3.	Bramhangavan Lift Irrigation Scheme –I	: 27.518 Mcum
4.	Individual lifts on reservoir & river	: 64.88 Mcum
	Total	: 202.145 Mcum

The sanctioned non-irrigation uses from the reservoir are as under :

a.	Domestic Use		: 283.27 Mcum
b.	Industrial Use		: 160.74 Mcum
		Total	: 444.01 Mcum

There is no provision for non-irrigation use in the project planning of Paithan dam.

2.8 M.I. Schemes (Local Sector) :

There are large number of Minor irrigation projects and K.T.weirs planned and constructed by Local Sector Department in this sub-basin. Government has also given the priority for water conservation. In the present study, the schemes having annual water utilization more than 0.15 Mcum (5 Mcft) have been only considered in the respective complex.

3.0 Jayakwadi Project :

Jayakwadi Project on the Godavari river with a catchment area of about 21774 Sq.Km. is a multipurpose project of Maharashtra State for irrigating net irrigable area to the tune of 277207 Ha. in Aurangabad, Beed, Parbhani & Nanded Districts of Marathwada Region. The Jayakwadi Project Stage-1 was originally administratively approved by Government of Maharashtra vide Resolution No. PIM 3164/103171-IP (Cell), Bombay, dated 13.01.1965. The Project was cleared by Planning Commission, Govt. of India vide letter No. III-2 (23)/64 – I & P dated 03.02.1965. This Project was completed in the year 1976.

The Jayakwadi Project Stage-I consists of;

a) Jayakwadi Reservoir on the Godavari river above Paithan town with the gross storage capacity 2909.04 Mcum (102.73 TMC) & live storage capacity 2170.935 Mcum (76.66 TMC).

b) Paithan Left Bank Canal starting from the Paithan Dam 208 Km. in length to cover the gross command and net irrigable area of 204050 Ha. & 141640 Ha. respectively.

Planning Commission, Govt. of India in letter dated 03.02.1965 suggested that the Paithan dam with its Left Bank Canal only be taken up as Jayakwadi Project Stage-I and the remaining components of the project be covered by a separate report as Jayakwadi Project Stage-II. Accordingly, Jayakwadi Project Stage -II originally administratively approved by Govt. of Maharashtra vide Resolution No. PIM 4973/43043 – IPI, Sachiwalaya, Mumbai dated 25.05.1974. The Stage-II was cleared by Planning Commission, Govt. of India vide letter No. II-15 (1) (14)/76-I & CAD dated 02.06.1976.

Jayakwadi Project Stage-II consists of;

a) Majalgaon Reservoir on the Sindaphana river, a tributary of the Godavari river near Majalgaon town with the gross and live storage capacities of 444.65 Mcum (15.70 TMC) & 311.30 Mcum (10.99 TMC) respectively and Majalgaon Right Bank Canal 165 Km. long with gross command and net irrigable area of 131520 Ha. & 93885 Ha. respectively.

b) Paithan Right Bank Canal starting from the Paithan dam 132 Km. in length to cover the gross command and net irrigable area of 59892 Ha. & 41682 Ha. respectively.

The original project report of Jayakwadi was prepared in the year 1964. The project has been planned for 75% dependable virgin yield. Jayakwadi catchment was almost virgin (with the existence of Gangapur, Bhandardara & Darna dams only). As per revised project report 1985, 75% dependable annual virgin yield was estimated 5566 Mcum (196.56 TMC) upto Paithan dam in which the upstream utilization was 3270 Mcum (115.50 TMC) and 2564.71 Mcum (90.57 TMC) for Jayakwadi including regeneration of 245.25 Mcum (8.66 TMC) from upstream utilizations.

The water utilizations from Paithan dam are planned as under :

1.	Paithan Left Bank Canal	: 1075.54 Mcum
2.	Paithan Right Bank Canal	: 318.22 Mcum
3.	Paithan lake losses	: 664.83 Mcum
4.	Diversion to Majalgaon in bad years	: 560.00 Mcum
	Total	: 2618.59 Mcum

There is no provision for non-irrigation use in the project planning of Paithan dam.

The storage (Live) planning of Paithan dam is done considering utilizations through canals with only 20% Kharif requirement, fair weather lake losses, 560 Mcum diversion to Majalgaon dam in bad years of Majalgaon and carry over provision of 381.70 Mcum. The Post Monsoon flow (151.77 Mcum) and regeneration at 7.5% of upstream extractions (245.25 Mcum) is accounted while deciding the storage. The design live storage is 2170.935 Mcum (76.66 TMC).

4.0 Constitution of Study Group :

The Jayakwadi Project was planned in the year 1964. At that time, the catchment of Paithan dam was almost virgin with the existence of Gangapur, Bhandardara and Darna dams only. In the revised Project Report 1985, the 75% dependable net yield was estimated at Paithan dam as 2564.71 Mcum (90.57 TMC) including regeneration of 245.25 Mcum (8.66 TMC) from upstream utilizations. The past record shows that the Paithan dam does not receive the estimated yield. Since year 1975, Paithan dam has received design yield or more in 17 years out of 38 years (Statement -3). In year 2012, the Paithan dam had received meagre yield from the catchment. The live storage achieved was 71.90 Mcum (3.31%) on October 10, 2012. To meet the drinking water needs from the Paithan reservoir, the Executive Director, Godavari Marathwada Irrigation Development Corporation, Aurangabad vide letter dated September 4, 2012 had requested Water Resources Department, Government of Maharashtra for the release of 250 Mcum (8.82 TMC) water from upstream storages. Also the Public Representatives, Hon. Members of Parliament and Legislative Assemblies, Guardian Ministers had requested the Government authorities for the release of water from the upstream dams into Paithan dam. Some strong Rasta-Roko agitations were performed. Taking into account the requirements of the upstream areas and Paithan dam, the Government had taken decision to release 325.65 Mcum (11.50 TMC) water from upstream dams in the month of October and November, 2012, in view of the priorities of water use in State Water Policy and such releases are technically & practically feasible, considering the evaporation losses from reservoirs and transit losses from the carrier (river) system.

In Public Interest Litigation Petition No. 100/2012, in the High Court of Judicature of Bombay Bench at Aurangabad, the Petitioner has requested Hon'ble High Court to direct the State Government and Maharashtra Water Resources Regulatory Authority to release water in Paithan dam from upstream dams so as to ensure the approximate equitable distribution of water contemplated under clause (c) Section 12(6) of the MWRRA Act, 2005. An Affidavit in reply was filed by the State Government, in which it was submitted to the Hon. High Court that the equitable distribution of water as per Section 12 (6)(c) of MWRRA Act is not technically and practically implementable in toto as demanded by Petitioners. However, some principles for regulation of reservoirs operated as a part of integrated system of reservoirs in a sub-basin can be formulated for filling period (i.e. Monsoon period), so that Paithan dam will

receive some quantum of water before surplusing from upstream dams. Hon. High Court has directed to the State Government on December 19, 2012 that these regulations should be submitted within 3 months.

In light of above background, the Water Resources Department, Government of Maharashtra has constituted the Study Group under Marathi Resolution No. Misc-2012/(891/12)/2012/IM(P) dated 29th January, 2013 (Appendix-1) for formulation of regulations/ guiding principles on integrated operation of reservoirs during filling period in Godavari basin (upto Paithan dam). The Water Resources Department under Marathi Resolution No. Misc-2012/ (891/12)/2012/IM(P) dated 7 March, 2013, has included Mr. A.B.Patil, Executive Director, Godavari Marathwada Irrigation Development Corporation, Aurangabad as Special Invitee in the Study Group/ (Appendix-2)

The composition of the Study Group is as under:

1.	Mr.H.T.Mendhegiri, Director General, WALMI, Aurangabad	Chairman
2.	Mr.C.A.Birajdar, Chief Engineer (SP), Water Resources Department, Pune	Member
3.	Mr. H.K.Gosavi, Chief Engineer, Planning & Hydrology Project, Nashik.	Member
4.	Mr. B.C.Kunjir, Chief Engineer, North Maharashtra Region, Water Resources Department, Nashik.	Member
5.	Mr. B.M.Sukare, Chief Engineer & Chief Administrator, CAD, Water Resources Department, Aurangabad	Member
6.	Mr.A.B.Patil, Executive Director, Godavari Marathwada Irrigation Development Corporation, Aurangabad	Special Invitee
7.	Mr.A.P.Kohirkar, Superintending Engineer, Godavari Marathwada Irrigation Development Corporation, Aurangabad	Member Secretary

Terms of Reference for the Study Group :

The terms of references for the Study Group are as below :

1. To formulate guidelines for integrated operation of reservoirs during filling period in Upper Godavari (upto Paithan dam) sub-basin so that likely water scarcity situation in Paithan dam may not be attained.

2. To develop mechanism for effective implementation of such guiding principles.

3. To suggest on reforms about the technical, financial and management aspects thereof.

Time Frame:

Original time period was upto 31 March, 2013 for submission of Study Group report. Looking to the wider scope, complexity involved and the time period required for data submission, the extension upto 31st May, 2013 was granted by Government vide Marathi Resolution No. Misc-2012/(891/12)/2012/IM(P) dated 27 May, 2013 (Appendix-3)

The required information and data for the study group was submitted by the Godavari Marathwada Irrigation Development Corrporation, Aurangabad on 21 May, 2013. The time extension upto 31st July, 2013 is granted by Government vide Marathi Resolution No. Misc-2012/(891/12)/2012/IM(P) dated 30 July, 2013 (Appendix – 4)

Chapter: 2

GENERAL APPROACH

1.0 General:

The Water Resources Department, Government of Maharashtra vide Marathi resolution no. Misc-2012/(891/12)/2012 IM(P) dated 29 January 2013 has constituted the Godavari Study Group for formulation of regulations/guiding principles on integrated operation of reservoirs in Upper Godavari (upto Paithan Dam) sub basin with the following three (3) Terms of References:

1. To formulate guidelines for integrated operation of reservoirs during filling period in Upper Godavari (upto Paithan dam) sub-basin so that likely water scarcity situation in Paithan dam may not be attained.

2. To develop mechanism for effective implementation of such guiding principles.

3. To suggest on reforms about the technical, financial and management aspects thereof.

The scope of the study given in TOR is broad. The Upper Godavari (upto Paithan dam) sub basin is having total geographical area of 21774 Sqkm. The sub basin is divided into two parts viz. Upper reach along Sahyadri range and lower downstream reach. The upper reach (Western Ghats) receives heavy rainfall while the lower reach falls under rain shadow belt having low rainfall. This sub basin is a well developed from water storage considerations. However, the factors like rapid urbanization due to high increase in population and faster industrial development are putting stress on available water resources. The development in agriculture and urban sectors has not only posed substantial increase in water demands for various uses, but resulted in conflicts which are critical in nature now itself. The fact that the sub basin water resources remain more or less fixed and demands would go on increasing rapidly.

Large number of major, medium dams have been constructed in the upper reach for water conservation purposes and utilization of the available water resources and also because technically most ideal dam sites are available in Ghat areas. At present, the operation of reservoirs is being done separately for individuals

reservoirs considering as single entity. Because of increase in water demands due to faster development in agriculture & industry sectors as well as high increase in population and urbanization, the upstream utilizations have increased than anticipated at the time of project planning of Paithan dam. This has resulted to some extent in lesser inflows (net yields) in Paithan dam as the water resources of the sub basin are more or less fixed. The past record shows that the Paithan dam has received design yield of 2564.71 Mcum (90.57 TMC) or more in only 17 years out of 38 years (Statement-3). The water stress situation in lower reaches viz. Paithan dam of Marathwada region, thereby creating competition and conflict among the different Category of Uses and among the upper reach and lower reach Water Users.

The State Water Policy formulated by Government of Maharashtra in 2003 also envisages that the water resources of the state shall be planned, developed, managed with a river basin and sub basin as the unit. This policy has strategy to create the enabling environment for better and more equitable and productive water resources management in an environmentally sustainable manner for promoting growth reduction in poverty and minimizing regional imbalance. The water management is now a challenge for Water Resources Engineers to adopt a strategy for the integrated operation of reservoirs in the filling period on the principles of approximate equal distribution of water at sub-basin level to achieve optimum utilization of the water resources available and to benefit best out of the system or systems of reservoirs (complex).

Government of Maharashtra, Water Resources Department has constituted the Godavari Study Group for formulation of guiding principles on integrated operation of reservoirs in Upper Godavari (upto Paithan dam) sub basin. Keeping all the above considerations in mind, the study group has decided the following procedure to approach the problem:

1. Holding meetings and deliberations
2. Collection of hydrological and water use data from field organization.
3. Analysis of data
4. Present water resources planning scenario study
5. Operating strategy for Reservoir Operation
6. Literature study
7. Discussions and conclusions.

2.0 Meetings And Deliberations:

The Study Group have conducted eight (8) meeting as below:

2.1 First meeting on 13/02/2013 at WALMI, Aurangabad.

The deliberations on the following points were held in this meeting:

a) General discussions on the various aspects of Upper Godavari (upto Paithan dam) sub-basin were held.

b) The sub basin area was divided in to different river systems (complex) for study purpose.

c) The information and data required about completed, on going and planned Major, Medium and Minor projects was discussed and proformae for submission of data prepared. Data for past 40 years was to be submitted to the study group within ten days by concerned field Chief Engineers.

d) Chief Engineer, Hydrology Project, Nashik was requested to submit note on DSS for IWRM for Upper Godavari sub-basin with RIBASIM and Upper Bhima basin study with DSS Planning software.

e) Information on procedure followed for integrated reservoir operation of Narmada Project and Sardar Sarovar Project is to be made available by Chief Engineer, NMR, Nasik

2.2 Second meeting on 08/03/2013 at WALMI, Aurangabad

The deliberations on the following points were held in this meeting:

a) Information and data submitted by the Chief Engineer & Chief Administrator, Aurangabad was checked by the study group and discrepancies pointed out. Proformae for submission of data were revised and 11 proformae were prepared as per the suggestions of the members.

b) The data and information was to be submitted by Chief Engineers to GMIDC upto 16 March 2013.

c) The data submitted by Chief Engineers is to be validated in GMIDC office before submitting to study group.

d) Member Secretary was instructed to collect guidelines from CWC, New Delhi on integrated operation of reservoirs.

2.3 Third meeting on 21/03/2013 at WALMI, Aurangabad.

The deliberations on the following points were held in this meeting:

a) The status of study group work was reviewed by the Principal Secretary (WRM & CAD) on 20/03/2013. In this review meeting, it was agreed by Executive Director, GMIDC that the data will be made

available to the study group by 31 March 2013. Two months time period after data submission was agreed for study group.

b) The information and data submitted by the Chief Engineer & Chief Administrator, Aurangabad was checked and discrepancies were pointed out. Raw data of Nasik and Ahmednagar area was checked and field officers were guided for data submission.

c) It was suggested that the Local Sector Schemes having water use more than 5 mcft shall be included in the information.

d) The Executive Director was requested to submit validated information and data at GMIDC level.

2.4 Fourth meeting on 5th & 6th April 2013 at WALMI, Aurangabad

The deliberations on the following points were held in this meeting:

a) The information and data in Annexure 1 to 11 was submitted to the study group by GMIDC on 04/04/2013. The data was checked and found that there were lot of discrepancies and there was no uniformity in assumptions. The study group suggested that the technical support of an expert in Hydrology may be taken, if required.

b) The information submitted was not inclusive of local sector projects.

c) GMIDC agreed to submit the corrected data on 15/04/2013.

d) Note on changes in rainfall pattern was to be submitted by Hydrology Project, Nasik.

2.5 Fifth meeting on 17th & 18th May 2013 at WALMI, Aurangabad

The deliberations on the following points were held in this meeting:

a) The validated information and data was submitted by GMIDC on 14/05/2013. This data and information was checked for consistency with reference to various systems/complex and discrepancies were pointed out.

b) Executive Director, GMIDC agreed to submit finally corrected and validated data on 20/05/2013.

c) It was decided that the proposal for extension of time period i.e. upto 20/07/2013 to be submitted to Government.

2.6 Sixth meeting on 30/05/2013 in Mantralaya, Mumbai

The deliberations on the following points were held:

a) The corrected data and information was finally submitted by Executive Director, GMIDC on 21st May 2013. All this data was made available to all members for study.

b) The study concept and outline of the report was discussed.

c) The status of study group work was reviewed by the Principal Secretary (WRM & CAD). Time extension upto 20/07/2013 was requested.

2.7 Seventh meeting on 14 June 2013 at WALMI, Aurangabad

The seventh meeting was held in presence of Principal Secretary (WRM & CAD) on 14 June 2013 at WALMI. The deliberations on the following points were held in this meeting:

a) The Chairman presented the present water planning scenario in Upper Godavari (upto Paithan dam) sub-basin. Similarly, the priority for getting minimum 25 TMC of inflow into Paithan dam during monsoon 2013 was highlighted.

b) Time extension up to 20/07/2013 was agreed by Principal Secretary (WRM & CAD).

2.8 8th meeting on 18 to 20 July 2013 at WALMI, Aurangabad

The 8th meeting was held in WALMI, Aurangabad from 18/07/2013 to 20/07/2013. The Study Group prepared the write up for the report, discussed among the members in this meeting.

2.9 9th meeting on 8 August, 2013 at WALMI, Aurangabad

The 9th meeting was held in WALMI, Aurangabad on 08/08/2013. The Study Group finalized the report in this last meeting.

3.0 Data Availability:

The Executive Director, Godavari Marathwada Irrigation Development Corporation, Aurangabad has submitted the requisite data and information about completed, ongoing and planned Major, Medium and Minor irrigation projects in prescribed proformae vide Marathi letter no. GMIDC/T-1/4338 dated 21 May 2013. The details of data and information are as under:

1) Information about Major, Medium and Minor Irrigation Projects in Upper Godavari (upto Paithan dam) sub basin (Annexure-1)
2) Information about availability of yield at various locations in Upper Godavari (upto Paithan dam) sub basin (Annexure-2)
3) Information about water requirement (Demand) from various Reservoirs/Dams (Major and Medium Project) in Upper Godavari (upto Paithan dam) sub basin (Annexure-3)
4) Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan dam) sub basin (Annexure-4)
5) Information about Kharif utilizations from Major and Medium projects in Upper Godavari (upto Paithan dam) sub basin (Annexure-5)
6) Information about Rabi utilizations from Major and Medium projects in Upper Godavari (upto Paithan dam) sub basin (Annexure-6)
7) Information about Hot Weather Utilizations from Major and Medium projects in Upper Godavari (upto Paithan dam) sub basin (Annexure-7)
8) Information about Depth of Evaporation from Reservoirs in Upper Godavari (upto Paithan dam) sub basin.
9) Information about approved Reservoir Operation Schedule for Gated Dams in Upper Godavari (upto Paithan dam) sub basin
10) Information about Elevation Capacity Table for Gated Dams in Upper Godavari (upto Paithan dam) sub basin
11) Information on salient features, latest approved water planning for Major and Medium Projects

The hydrological and water use data of completed, ongoing and planned projects as submitted by GMIDC are enclosed in Annexure 1 to 7.

4.0 Literature Study:

In general, the following documents & literature are referred.

1. Detailed Project Reports of various Major and Medium Irrigation Projects planned and constructed in Upper Godavari (upto Paithan dam) sub-basin.

2. CWC, New Delhi publication on "Real time integrated operation of Reservoirs" (April, 2005)

3. I S - 7323 – 1994 on Operation of Reservoirs – Guidelines.

4. I S - 5477 (Part-I)-1969 on methods for fixing the capacities of Reservoirs

5. CDO Report on Jayakwadi-Majalgaon Simulation Studies (Nov.2001).

6. CDO Note on Water Availability Studies for Jayakwadi Project (May, 2004).

7. Maharashtra State Water Policy (July, 2003)

8. Maharashtra Water Resources Regulatory Authority Act, 2005

9. Maharashtra Water Resources Regulatory Authority (Allocation & Monitoring of Entitlements, Disputes and Appeals and other Matters), Rules, 2013.

10. The Report of the Godavari Water Disputes Tribunal with the Decision (Year 1979)

11. Report of the Second Maharashtra Water and Irrigation Commission (Year 1999)

12. Study on "DSS for IWRM of Upper Godavari River Basin (upto Paithan dam)" by Hydrology Project, Nashik (Year 2003).

13. Purpose Driven Study (PDS) on "Effect of Changing Water Allocation in Jayakwadi Project" by Hydrology Project, Nashik (Year 2011)

14. Rainfall statistics from www.mahaagri.gov.in (Department of Agriculture, Govt. of Maharashtra).

15. National Water Mission Comprehensive Document (April 2011)

Chapter: 3

DISCUSSIONS AND CONCLUSIONS

1.0 Objective of Present Study:

One of the Terms of Reference for this Godavari Study Group is "To formulate guidelines for integrated operation of reservoirs during filling period in Upper Godavari (upto Paithan dam) sub-basin so that likely water scarcity situation in Paithan dam may not be attained". In the Water Availability Studies of year 2004, the Central Designs Organizations, Nashik has estimated the 75% dependable annual virgin yield of 4451.50 Mcum (157.20 TMC) at Paithan dam site. The data supplied by GMIDC indicates that the large number of major, medium and minor irrigation projects are planned and completed in this sub basin (Statement-5). The Design Water Use of these project is about 7174.72 Mcum (253.37 TMC). This design water use is from projects having planned at varying dependabilities ranging from 50% to 75% including local sector schemes more than 5 Mcft water use. The sanctioned non-irrigation uses in this sub basin are as under:

a.	Domestic use	:	693.09 Mcum
b.	Industrial use	:	283.07 Mcum
		Total	976.16 Mcum

The provision for total non-irrigation use in the project planning of dams in this sub basin is 247.121 Mcum only.

The large scale irrigation storage creation in comparison with the available water in sub basin and increase in upper reach utilizations has resulted into water stress situation in lower reaches of sub basin. The result of this situation is that there is a need to ensure judicious, equitable and sustainable management, allocation and utilization of water resources among the different category of uses and among the upper reach and lower reach water users.

The objective of this study is to make water balance scenario considering the different probabilities of inflows and various demands to a maximum possible extent, adopting sub basin as the unit. The concept of operation of reservoir considering it as a single entity has to be given way to the concept of integrated operation of reservoirs to achieve approximate equal distribution of water at sub basin level and to benefit best out of the system or systems of reservoirs (complex).

2.0 Upstream Design (Plan) Utilizations:

In the Jayakwadi project report of 1964, the utilizations planned upstream of Paithan dam were shown as 3270 Mcum (115.5 TMC). The same figure was also shown in revised project report of 1985. When CDO, Nashik had taken the simulation study in 1990 to 1994 as directed by Government of Maharashtra, same upstream utilizations were considered as the details of utilizations were not supplied by field officials. During the revised simulation study carried out by CDO in 2001 (with yield series estimated & approved by CWC in 1990), as directed by Government of Maharashtra, the details of upstream utilizations of all major, medium and minor projects were obtained from field officials. The upstream utilizations were increased from 3270 Mcum to 4150.2 Mcum (146.56 TMC). It is mainly due to planning of large number of medium and minor projects in the catchment. Now, the data presented by GMIDC to Study Group indicates that the upstream utilizations is further increased to 4556.12 Mcum (160.89 TMC). The increase in upstream utilizations at the various stages of development is illustrated in Table-1.

Table-1: Upstream Design (Plan) Utilizations

(Figures in Mcum)

Complex	A. A Provision (1964 & 1985)	CDO Study (2001)	CDO Study (2004)	Present Status (2013)
(A)Major Projects				
1)Mula	807.03	824.73	824.73	704.63
2)Pravara	736.24	753.23	753.23	786.41
3)Gangapur	226.54	222.68	222.68	169.61
4)Godavari-Darna	940.13	948.93	948.93	1204.49
5)Palkhed	447.41	444.58	444.58	456.52
Total Major Projects	*3157.35*	*3194.16*	*3194.16*	*3321.66*
(B) Medium Projects	0.00	383.70	383.70	421.38
(C) Minor Projects	113.27	572.29	496.11	813.08
Grand Total (Mcum)	*3270.62*	*4150.20*	*4073.97*	*4556.12*
Grand Total (TMC)	*115.5*	*146.56*	*143.87*	*160.89*

3.0 Water Availability:

3.1 Previous Water Availability Studies: Water availability studies for Jayakwadi Project were carried out in the year 1964 at the time of original administrative approval and in the year 1985 for revised project report by Irrigation Projects Investigation Circle, Aurangabad and then in year 1990 by Central Designs Organization, Nasik in consultation with CWC, New Delhi

As per 1964 Jayakwadi project report, net run-off series at Paithan dam was estimated by deducting upstream utilizations of 3270 Mcum (115.5 TMC) and adding regeneration from upstream utilizations. From this series, 75% dependable annual net yield was worked out as 2288.04 Mcum (80.80 TMC) for Jayakwadi Project. For catchment area below N.M. weir, below Ozar weir & below Mula dam, yield was worked out considering Strange's coefficient as "good". For the catchment upstream of above mentioned dam sites, N.M.weir actual flows, Ozar weir actual flows & Mula long term series based on A.A.Report details have been considered. Report 1964 appears to have been prepared based on the expertise available and available data at that time. The Jayakwadi project was planned for water utilization of 2618.59 Mcum (92.47 TMC). CWC had made some comments on this study. In view of inclusion of some works of Jayakwadi Project Stage – I and Stage–II under World Bank aided MCIP III and in view of remarks raised by CWC at the time of clearance of the original project report 1964, the revised project report was prepared in 1985. Yield studies in this revised project report were refined. The upto date runoff data at Mungi river gauging station for the period from 1968 to 1977 was used. To work out the yield, the rainfall-runoff correlation was derived with help of rainfall data of 24 rain gauge stations for the period of 1927 to 1978 and river gauging station at Mungi, established by state near Paithan dam site and series of 51 years was generated at Paithan dam site. As per report 1985, 75% dependable annual virgin yield was worked out as 5566 Mcum (196.56 TMC). Out of this 3270 Mcum (115.5 TMC) was for upstream utilizations and 2565 Mcum (90.57 TMC) was shown for Jayakwadi project including regeneration of 245.25 Mcum (8.66 TMC) from upstream utilizations. CWC, New Delhi compared Mungi river gauge data and Kaygaon Toka river gauge data maintained by CWC and had opined that Mungi river gauge data was over estimated. So, the yield worked out in report 1985 appears to be over estimated.

The works up to 100 Km of Majalgaon Right Bank Canal (MRBC) were included in the original World Bank aided MCIP- III. At the time of reformulation, a proposal to include works of MRBC beyond Km 100 was submitted to World Bank. Since World Bank was not fully convinced about the adequacy of availability of water for the command area beyond 100 Km. World Bank decided to review hydrological and Simulation studies. As per yield and simulation study carried out by World bank expert, it was indicated that the proposal of MRBC beyond Km 100 was not economically viable. The studies indicated that after reserving water of 2890 Mcum (102 TMC) for the existing upstream projects at that time and for the projects under active implementation, the available yield was not sufficient to meet the complete requirement of commands of PLBC, PRBC and MRBC with the present cropping pattern . Hence it was inferred that any increase in upstream utilizations would adversely affect the availability of water for PLBC, PRBC and MRBC commands. World Bank study showed that the present system was failing to fulfill the demand planned over it. Since Government of Maharashtra was not agreeable to the procedure followed by the World Bank consultant in computing the available yield for the project, especially the method of double mass technique; the Government of Maharashtra directed

CDO Officials to discuss this issue with Dr. Dougles James, another World Bank Consultant on Hydrology. Accordingly, this issue was discussed with him. Dr Dougles James concurred with the view of CDO, Nashik that the double mass technique used by the then consultant in this case is not appropriate and thus leading to incorrect picture of performance of the project. Govt. of Maharashtra directed CDO, Nashik to take up the study afresh and get approved from CWC. CDO had carried out yield and simulation study in the year 1990 by using latest hydrological data required for the study. As per this study, 75% dependable annual virgin yield works out to 4830.04 Mcum (170.58 TMC) at Paithan dam. This study was approved by CWC, New Delhi vide letter dated 04/06/1990. This study was used for further analysis. The upstream utilizations were considered as 4150.2 Mcum (146.56 TMC). Hence, the net annual yield available for Jayakwadi including regeneration was worked out as 979.80 Mcum (34.60 TMC). Using this net yield series the simulation studies were carried out by CDO, Nashik.

As per C. W. C. Working Group Report and IS 5477 (Part-I)-1969, the performance of the project is to be decided by success. If the project is planned for 'over the year' storage projects (having carry over) and multipurpose, the performance is to be decided by using minimum 40 years runoff series. Using this minimum 40 years runoff series, the project is feasible if,

1. Irrigation requirement is fulfilled for 75% of its life period.
2. Domestic water requirement is fulfilled for 100% of its life period
3. Hydropower water requirement is fulfilled for 90% of its life period

This is as per Clause no 3.2.1 of IS 5477 – (Part-I)- 1969

Result of this simulation study showed that the Jayakwadi system was not capable to cater the demand planned over it. Government of Maharashtra, Water Resources Department constituted the committee under the Chairmanship of the Chief Engineer (P&V) & Jt. Secretary in July 1996 for,

i) To decide the exact water availability up to Jayakwadi

ii) To suggest most appropriate alternative to cater to the entire command area as far as possible

The Committee approved the water availability study already carried out by CDO, Nashik and concurred by CWC. From the 75% dependable yield, deducting upstream utilizations, the committee expressed that the balance yield was insufficient to cater full command area of the system. The Committee had made some suggestions. Considering the suggestions of the committee, CDO, Nashik had worked out 6 alternatives. The success rate for Jayakwadi project Stage-I was between 48.39% to 58.06% which is less than requirement of 75% for irrigation. Due to the increase in upstream utilizations from 3270 Mcum (115.50 TMC) to 4150.20 Mcum (146.56 TMC), the project is not capable of sustaining the planned demand or the modified demand suggested by the Committee.

3.2 April 2004 study: As the Paithan dam was not receiving the estimated yield, Government of Maharashtra had directed to update the study by considering the latest data upto 2003. For this study, the rainfall data from 1986 to 2003 alongwith tank gauge data was demanded from field officers. Field officers could not supply all rainfall data as some stations were closed. Due to non-availability of rainfall data from 1986 – 2003, the yield series was updated upto 1999. By using the yield series from 1925 to 1999 i.e. for 75 years, the 75% dependable annual virgin yield was worked out to 4451.50 Mcum (157.2 TMC). If the upstream utilizations of 4074.02 Mcum (143.87 TMC) are deducted from this yield, the net yield available at Paithan including regeneration works out to 671.69 Mcum (23.72 TMC). The average annual virgin yield at Paithan dam was worked out by CDO as 5467.53 Mcum (193.06 TMC). It is mentioned in the CDO note that the series updated by CDO in April 2004 for the period 1925-1999 (75 years) is purely for academic purpose.

3.3 Comparison of various yield studies: The comparison showing the availability of yield with reference to various studies is given in the Table-2

Table-2 Comparison of yield studies

(Figures in Mcum/TMC)

Sr. No.	Study Year	75% dep. virgin yield	Upstream utilizations	75% dep. net yield at Paithan
(1)	Project Report 1964	5558.04 196.30	3270 115.5	2288.04 80.80
(2)	Project Report 1985	5566 196.56	3270 115.5	2565 90.57
(3)	CDO study 2001	4830.04 170.58	4150.2 146.56	979.80 34.60
(4)	CDO study 2004	4451.5 157.20	4074.02 143.87	671.69 23.72

Note: Net yield includes regeneration from upstream utilizations.

3.4 Observed Net Yield at Paithan dam : The Project Officers have supplied the annual observed net yield series at Paithan dam for the period from 1975 to 2012 (Statement – 3). After arranging the yield series in descending order, the dependable yields are worked out as under :

(i) 100 % dep. : 122.05 Mcum

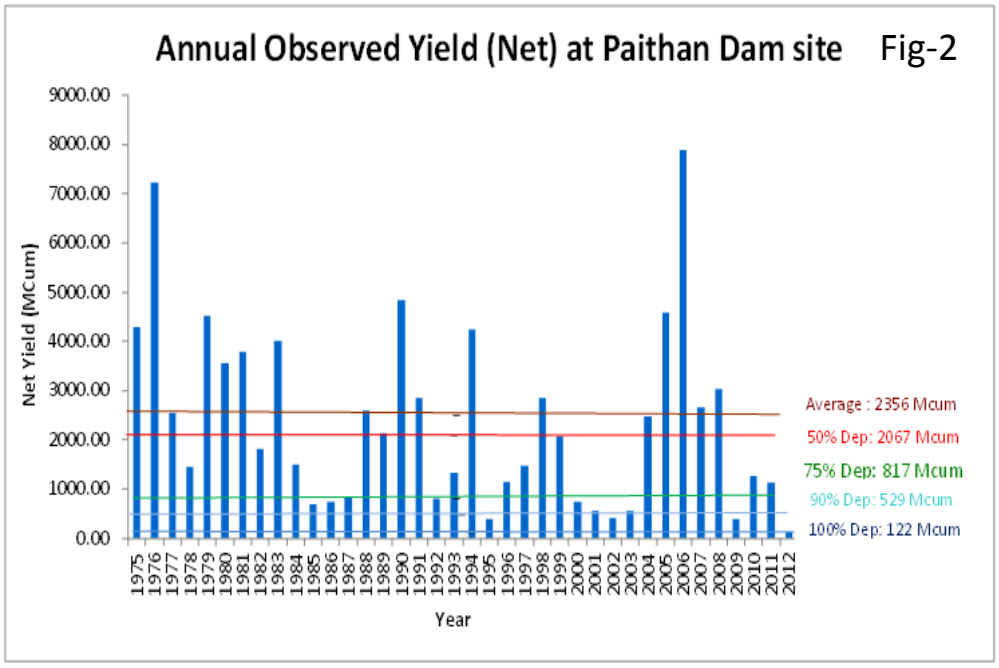
(ii) 90 % dep. : 528.79 Mcum

(iii) 75 % dep. : 816.53 Mcum

(iv) 50 % dep. : 2067.51 Mcum

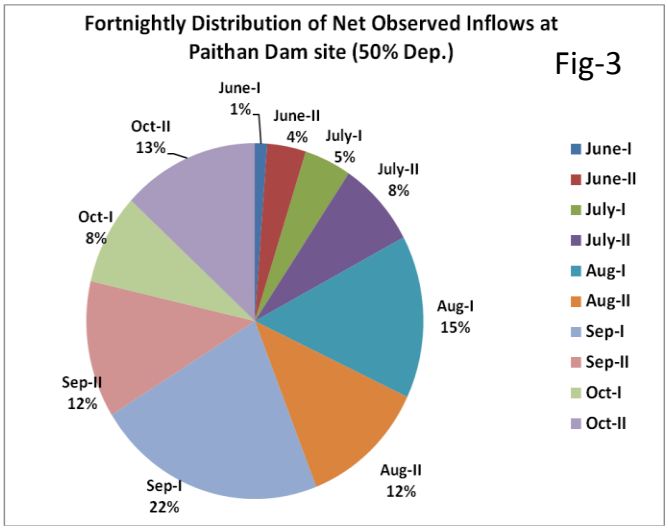
(v) Average : 2356.34 Mcum

Annual observed net yield at Paithan dam is presented in the Fig.2.



Since 1975, Paithan dam has received design yield of 2564.71 Mcum (90.57 TMC) or more in 17 years only out of 38 years. It is also observed from the yield series that there are consecutive bad years extending upto 2 to 4 years. Fortnightly distribution of 50% dependable net observed monsoon inflows at Paithan dam is presented (worked out by cumulative method) in the Fig.3 (Pie chart.)

From the Pie chart, it is seen that about 80% net inflows of Paithan dam are received during the months of August to October period. These observations support the rainfall characteristics described in para 5.0 of Chapter 3.0. The inflows in the Paithan dam are received predominantly during the month of August to September from upper reaches after fulfilling the storage requirements of upper dams and September to October from lower reaches(free catchment).



4.0 Interstate Aspects:

The Godavari Water Disputes Tribunal had submitted its report on 27th November 1979 (Bachawat Award) to Govt. of India. As per the GWDT award, Maharashtra State can use for their beneficial use all waters upto Paithan dam site on the Godavari river. This is as per the agreement dated 6 October 1975 between the Chief Minister of Maharashtra and Chief Minister of Andhra Pradesh. It is mentioned in the GWDT award that the rule of an equitable apportionment of the benefits of the river, each unit getting a fair share, should be applied in deciding water disputes regarding an interstate river.

5.0 Rainfall Characteristics:

Upper Godavari sub basin receives the major portion of its rainfall during the South-West monsoon period (June to September) than in North-East monsoon. About 85 to 90% of rainfall is received during the South-West monsoon period. The river therefore brings down most of its water between June and September. The monsoon season ends by October but during the next two months there are occasional freshets caused by north-east monsoon over that part of catchment which comes under its influence. Rainfall, however, varies widely in space and time.

The Western Ghats (Sahyadri Ranges) running parallel to the coast form a almost uninterrupted barrier. Heavy monsoon rains are occurred on ghats from South-West monsoon winds striking the barrier. The amount of rainfall on the ghats at any place is governed largely by the orographic features there. This factor introduces considerable spatial variation in the rainfall amount. This is illustrated in Fig.4.

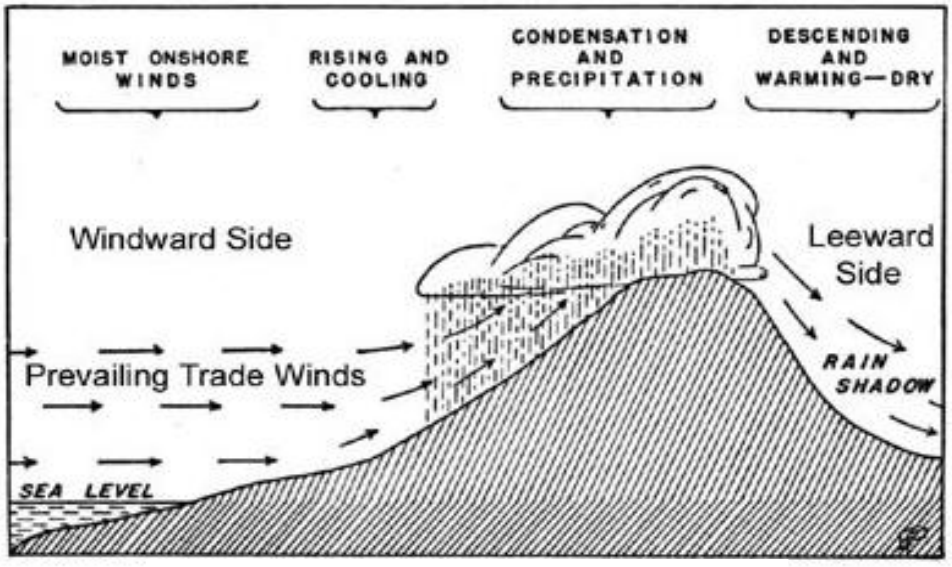
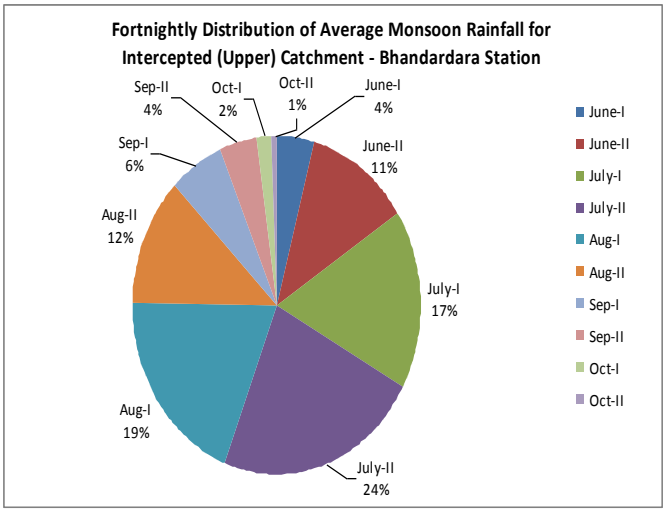


Fig : 4 OROGRAPHIC RAINFALL

In crossing the ghats, the monsoon winds lose a large part of the moisture. The sub basin receives high rains in the western ghats of reach about 128 Km which vary from 3000 to 1000 mm in this reach. East of the ghats, the annual rainfall decreases rapidly to about 600 – 500 mm. The rain shadow belt includes portions of Ahmednagar and Aurangabad districts. The rain shadow belt/region is also prone to frequent droughts. About 60% catchment of Upper Godavari sub basin falls in low rainfall zone. This part receives some rains in association with the depressions from the Bay of Bengal. The Upper Godavari sub basin map showing Isohyets is enclosed (Drg.2).

The normal date of commencement of the South-West monsoon is about the middle of June. The intensity of rainfall current increases from June to July, remains more or less steady in August and begins to weaken in the month of September. The normal date of withdrawal of South-West monsoon is between the 1st October to 15th October.

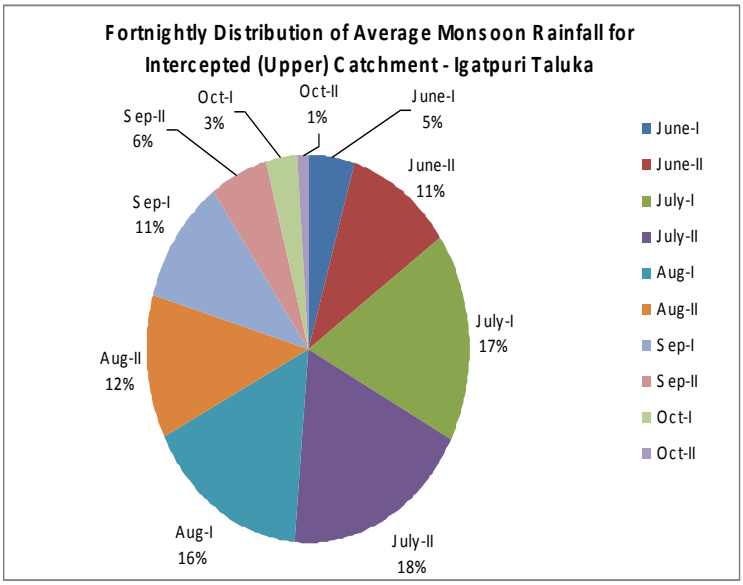


Bhandardara Station (Fig. 5)

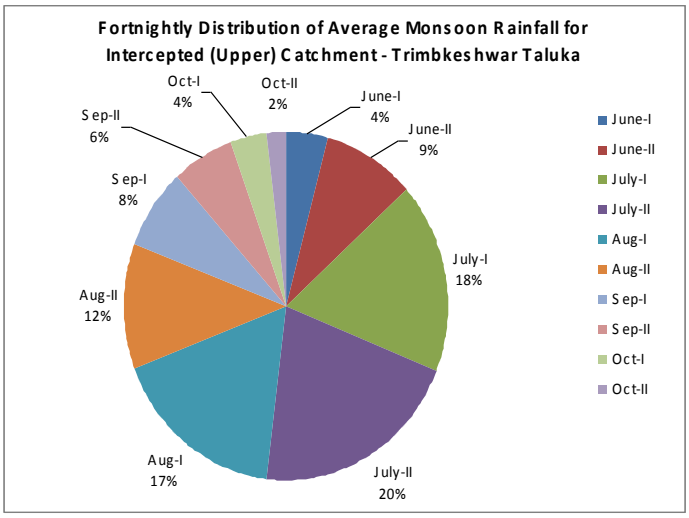
The rainfall data is collected for the raingauge station and taluka area from Water Resources Department and Agriculture Department of Government of Maharashtra. The Bhandardara raingauge station located at dam site represents the rainfall characteristics for Upper reaches of Pravara and Mula catchments.

Fortnightly distribution of long period average monsoon rainfall is presented in Fig.5 (Pie Chart.)

Similarly, the Igatpuri taluka and Trimbakeshwar taluka represents the rainfall characteristics for upper reaches of Darna and Gangapur (Godavari) catchments. Fortnightly distribution of long period average monsoon rainfall are presented in Fig. 6,7 (Pie Chart.)



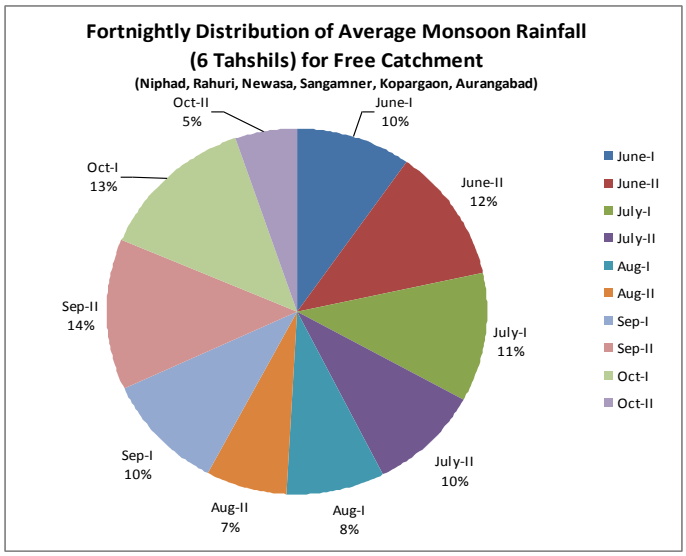
Igatpuri Taluka (Fig.6)



Trimbakeshwar Taluka (Fig. 7)

As may be seen from the three Pie Charts (Fig.5,6,7) that rainfall predominantly occurs during the months from June to August. About 80 to 85% of monsoon rainfall is received by the end of August in upper reaches (intercepted catchments).

The long period average monsoon rainfall of Niphad, Rahuri, Newasa, Sangamner, Kopargaon, Aurangabad talukas covers the unintercepted (free) catchments (lower reach) are also analysed. Fortnightly distribution of long period average monsoon rainfall of (average of 6 Tahsils) is presented in Fig.8 (Pie chart.)



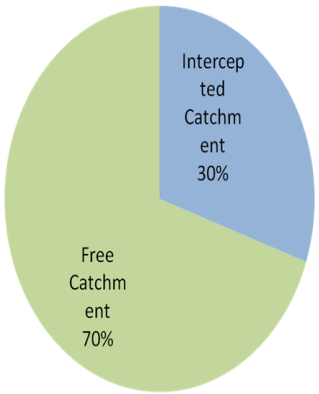
Free catchment (Fig-8)

As may be seen from the Pie chart that the rainfall occurs during the five months from June to October. The lower reach areas are also influenced by Bay of Bengal currents. The rainfall during the month of September and October is quite predominant.

The rainfall characteristics of upper and lower reaches (catchments) will have to be considered while deciding the operating strategy for integrated operation of reservoirs in the systems of reservoirs (complex); especially with reference to;

(i) How much water to be stored and released at upper dams.
(ii) When water to be stored and released at upper dams.

6.0 Unintercepted (Free) Catchment:



Details	Area in Sq .Km.
Total Catchment	21774
Intercepted Catchment	6593
Free Catchment	15181

Fig.9 : Catchment Area for Paithan Dam

Large number of major and medium dams have been constructed in the upper reach catchment for water conservation purposes and utilization of the available water resources, because of two main reasons viz: (i) technically most ideal dam sites available in ghat areas, and (ii) major source of sub-basin yield

in ghat areas. The distribution of catchment area upto Paithan dam is presented in Fig.9 (Pie chart).

The unintercepted catchment area is 69.72%. The Upper Godavari sub-basin map showing Isohyets is enclosed (Drg.2). Free catchment area is having low rainfall of about 500 to 600 mm.

The development of Agriculture in the lower reach (free catchment) has increased the water demands. So the large number of state and local sector minor irrigation projects & K.T.weirs are constructed to harness the available water. During the study group deliberations, it was informed that the monsoon river flows are diverted into canals for Kharif utilizations, flood canals, river channels / streams for feeding tanks, farm ponds, etc. This is resulting into the scarce availability of inflows into Paithan dam from free catchment. The data and information presented by GMIDC to study group indicates that the sanction for Kharif use on reservoirs & rivers and also through flood canals have been given to the extent of 144.92 Mcum (5.12 TMC). The water use through these arrangements are uncontrolled.

7.0 Previous DSS Studies:

7.1 Two studies are undertaken as Decision Support System under World Bank aided Hydrology Project (SW), Maharashtra, namely,…..

(1) IWRM of Upper Godavari River Basin (upto Paithan Dam) (RIBASIM Study)

(2) Water Resources Planning and Management

These two studies are described in short as below:

7.2 RIBASIM Study: This study was completed in December 2003. The Upper Godavari (upto Paithan dam) sub basin (excluding Jayakwadi Project) was selected as pilot study basin. The objective of this study was to forecast the water balance scenario for future and to evolve DSS to mitigate the impact of future demands to a maximum possible extent. RIBASIM software programme was used for this study. RIBASIM is a generic model package for simulation of the behaviour of river basins during varying hydrologic conditions. The model is a comprehensive and flexible tool to link the hydrologic input of water at various locations to the various water using activities in the basin and to evaluate a variety of measures related to infrastructure and operational management.

This study indicated that if no further measures are initiated to mitigate the future water demands in this sub basin, the deficit of 67 Mcum for the base year 2000 would shoot out upto a range of 1477 to 2139 Mcum for the year 2015 and to a

range of 1860 to 2574 Mcum for the year 2025. To reduce these anticipated deficits, certain measures in the form of strategies have been suggested. One of the suggestion is improvement in irrigation efficiencies from 39% to 49% to 55% by the years 2015 and 2025.

7.3 DSS (Planning): A decision support system for planning and management of water resources has been developed under the DSS Planning Project implemented under Hydrology Project-II. The system, which initially has been set up for the Upper Bhima Basin, is now operationalized in 2011. The River Basin model using MIKE Basin Software is set up.

The reservoirs in the Upper Bhima provide water to the various users throughout the year, mainly within the agricultural, domestic and industrial sector. Restrictions in the water allocation may be required from time to time depending on availability and user priority. The inflow to the reservoir depends on the climatic conditions in the coming months. It is likely that the inflow in the near future will resemble the inflow of earlier years. In order to provide a solid basis for planning, long time series of inflow to each reservoir in Upper Bhima have been generated using the observed data and hydrological modeling. It is now possible to test the performance of the reservoirs over the coming months for different water allocation plans and the likely range of inflow.

This DSS (Planning) model can be useful for,……

1. Assessment of Water Resources.
2. Water Balance Studies.
3. Long-term planning of water resources management to meet increasing demands.
4. Likelihood of filling of reservoirs.
5. Integrated reservoir operation.
6. Review of rule curves of reservoirs using long term analysis.
7. Analysis of inter basin transfer & Analysis of conjunctive surface and groundwater use in the command area.
8. Analysis of the impact of artificial recharge from either local runoff or reservoirs.

8.0 Increasing Water Use Efficiency:

Ministry of Water Resources, Government of India has formulated the National Water Mission (NWM) document with the main objective of "Conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within states through integrated water resources development and management". In many states there is increasing concern over the availability of water for domestic, irrigation and industrial use. These concerns are expressed in the National Water Mission Document. The DSDAP (Development of Synthesis and Draft Action Plan for improving water use efficiency (WUE) of irrigated

agriculture in selected States) Study analyzed some 30 case studies of major and medium irrigation (MMI) schemes and indicated that overall project efficiency of water resources projects is in the range of 30 to 40%. Therefore, National Water Mission emphasis the time line for action to increase WUE of the project by 20% by the year 2017. The promotion of micro irrigation techniques such as drip and sprinkler irrigation is considered as one of the important activities on priority for achieving the objectives of the NWM. Adopting the sprinkler and drip irrigation for irrigating the crops can improve the existing on farm irrigation efficiency from 50% to 80% and overall efficiency in the range of 50% to 60%.

9.0 Equitable Distribution of Water :

9.1 MWRRA Act, 2005: Maharashtra has enacted Maharashtra Water Resources Regulatory Authority Act, 2005 (MWRRA Act, 2005) which provides for the establishment of Authority to regulate water resources within the State, facilitate and ensure judicious, equitable and sustainable management, allocation and utilization of water resources.

In the section 11 of MWRRA Act, the powers, functions and duties of the Authority have been mentioned. In clause (c) and (m) of section 11, the following functions of Authority are mentioned:

(c) to determine the priority of equitable distribution of water available at the water resource project, sub-basin and river basin levels during periods of scarcity;

(m) in the event of water scarcity, the Authority, in compliance with its policy and rules for allocating such scarcity, shall adjust the quantities of water to be made available to all Entitlements and shall permit the temporary transfer of Water Entitlements between users and Categories of Users in accordance with the approval of the River Basin Agencies.

In general policies of the Authority, as per the provisions of section 12 sub-section (6) of MWRRA Act, the Authority shall fix the quota at project level, sub-basin level, on the basis of the some principles. The clauses (a), (b) & (c) of section 12 subsection (6) give the principles for sharing of the distress as mentioned below:

(a) for equitable distribution of water in the command area of the project, every landholder in the command area shall be given Quota;

(b) the Quota shall be fixed on the basis of the land in the command area :
Provided that, during the water scarcity period each landholder shall, as far as possible, be given Quota adequate to irrigate at least one acre of land;

(c) in order to share the distress in the river basin of sub-basin equitably, the water stored in the reservoirs in the basin or sub-basin, as the case may be, shall be controlled by the end of October every year in such way that, the percentage of utilizable water, including kharif use, shall, for all reservoirs approximately be the same.

As per Section 14 sub-section (4) of MWRRA Act, Water shall not be made available from the canal for perennial crops in such area and from such date as may be notified by the Authority, unless the cultivator adopts drip irrigation or sprinkler irrigation or such other water saving technology approved by the Authority. The quantity of water so saved, after satisfying the future increased demand of drinking water, shall be distributed equitably in the command area and the adjoining area.

9.2 MWRRA Rules, 2013: Maharashtra Water Resources Regulatory Authority (Allocation & Monitoring of Entitlements, Disputes and Appeals and other Matters) Rules, 2013 have been published on 30 April, 2013. In **sub-Rule 2 (1) (c),** the word "water scarcity" or "distress" is defined as under :

"water scarcity" or **"distress"** in relation to a particular water resources project, means a situation when actual availability of live storage is less than 33% of design live storage of that project as on the 15th October.

Rule 11 is regarding the "Equitable distribution of water during water scarcity" which is reproduced as under:

Equitable distribution of water during water scarcity –

(1) The Authority shall, during the period of water scarcity, determine the priority of equitable distribution of water available at the water resources project level in particular and wherever technically and practically feasible, also at sub basin and basin level.

(2) During the period of water scarcity, if available live storage in a particular water resources project is not adequate to meet the drinking water needs, release of water from upstream major or medium water resources projects may be considered by the Authority;

Provided that such releases shall be considered only if, -

(i) the drinking water needs of such upstream projects are met fully; and

(ii) such releases are technically and practically feasible.

(3) While planning the release of water under sub-rule (2), evaporation losses and transit losses shall be accounted for. The concerned River Basin Agency shall specify the operating procedure for release of water from upstream projects.

(4) During the period of water scarcity, after satisfying the drinking water requirements from the water resources projects, the apportionment of remaining water shall be decided by the River Basin Agency.

9.3 State Water Policy (July 2003): Maharashtra has adopted State Water Policy in 2003. Some important principles laid down are highlighted below:

(1) **Para 2.1.1**: The water resources of the State shall be planned, developed, managed with a river basin and sub basin as the unit, adopting multi-sectoral approach and treating surface and sub-surface water with unitary approach.

(2) **Para 2.8**: The distress in water availability during deficit period shall be shared equitably amongst different sectors of water use and also amongst upstream and downstream users.

(3) **Para 3.0**: The water resources of the State shall be used, conserved and managed to provide the maximum economic and social benefits for the people of the State and in a manner that minimizes regional imbalance and maintain important ecological values within rivers and adjoining lands. All agencies of the State shall cooperate in the provision of the optimum integrated benefit to be derived from the State's water resources.

10.0 Evaporation from Reservoir:

The planning of Paithan dam was done considering the annual lake evaporation losses of 664.83 Mcum. The Hydrology Project, Nashik has carried out the Purpose Driven Study (PDS) in year 2010-11 on "Effect of changing Water Allocation in Jayakwadi Project". In this study report, the evaporation loss through Jayakwadi reservoir was analyzed with reference to observed evaporation lake losses for the years when storage was more than 90% full. In this report, it is concluded that the actual evaporation losses are about 60% of losses assumed in project planning. CWC, New Delhi had suggested the evaporation depth of 2.36 m considering the pan evaporimeter data of Golegaon station to be considered for earlier Jayakwadi simulation study. The Golegaon station is about 250 Km away from Paithan Reservoir. So CDO, Nashik had carried out detailed analysis considering the climatological stations established in and around the catchment such as Paithan dam site itself, WALMI (Aurangabad), Pune, Niphad. Using this data and applying necessary correction factors, a depth of 2 m was estimated.

This estimation was concurred by CWC, New Delhi in the year 1991 for using in simulation study of Jayakwadi Project (Sept 1994). Hence, 2.0 m annual depth of evaporation is considered in the present study. The annual lake losses works out to be 594.04 Mcum for the good year (Statement-11).

Niphad climatological station data is used for working out the evaporation depth for upstream reservoirs. The depth was worked out as 2.32 m. by CDO, Nashik in Sept. 1994 study and same is used to compute evaporation of all upstream major and medium projects considered in the present study.

11.0 Physical Constraints:

Water Resources projects are classified into three categories, namely major, medium and minor irrigation projects. The minor projects are having cultural command area less than 2000 Ha. and are having small size storage. They are designed with 50% dependable yield. Generally, they are also having no spillway gates for release of surplus water. In case of ungated dams, the release of water from live storage is possible only through canal outlet and river sluice, if provided. As the discharge capacity of such outlet/sluice is small and inadequate to release water through river from feeding downstream projects. If releases are made in smaller/ lesser quantities, there will be huge transit and evaporation losses in the carrier (river) system. It is most likely that released water will not reach the downstream reservoir. The releases are technically and practically feasible from gated spillways of medium and major projects. Fig. 10 shows the typical cross section of Mula dam.

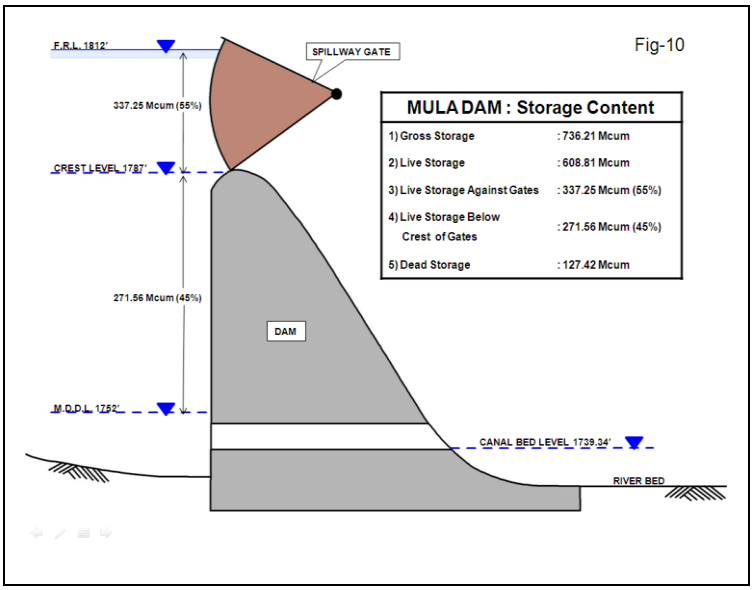


Fig-10

There are 16 major and 7 medium projects (Total = 23 dams) located in the upper reaches and which are considered for study. Out of these 23 dams, 13 dams are having spillway gates. Live storage below and above the crest of spillways of these 13 dams are worked out. It is found that on an average 53% of design live storage of all these dams is below crest. (Statement-1) So the 53% of design live storage is assumed as mandatory storage which would not be released for downstream.

12.0 Water Releases from Upper Dams in Year 2012:

There was a water scarcity in Marathwada region in the year 2012-13. To satisfy the drinking water demands as well as industrial demands (partly) from Paithan dam, the Government had taken decision for release of 325.65 Mcum (11.50 TMC) water from upstream dams in the month of October and November, 2012. The releases were made in two phases from three river complex. The release data is presented in the Table:3.

Table No. 3 Water Release Data

Complex	Period	Discharge Range (Cum/sec)	Quantity Released (Mcum)	Quantity Reached in Paithan dam (Mcum)	Length of Carrier system (Km)
1) Pravara	21.10.2012 to 27.10.2012	179.65 to 50.26	64.56	31.43 (48.68%)	175
2) Mula	28.11.2012 to 05.12.2012	265.33 to 10.28	73.90	153.20 (65.58%)	52
3) Pravara	29.11.2012 to 13.12.2012	232.71 to 50.26	74.76		175
4) Darna	30.11.2012 to 08.12.2012	209.72 to 65.97	84.95		180
Total			298.17	184.63 (61.92%)	-

It is observed that about 62% of released water actually reached into Paithan reservoir. Though the rivers were dry at the time of releases, the substantial quantity of water was reached due to preventive measures taken by the project officers, namely:

1) Water was released in sizable discharge taking into account river carrying capacity of perennial flow course.

2) Measures for prohibiting intermediate lifting of waters

3) Adopting efficient water management practices.

The natural river flows are being modified by impoundments such as dams, barrages and weirs. Mula, Pravara and Godavari are the main rivers contributing major inflows into Paithan dam. The river flow data of these rivers at gauging

sites are studied for last 10 years period. It is found that these rivers are flowing naturally in the months from August to September. If the releases from upper dams are made in this period, there will be minimal transit losses in the carrier system.

13.0 Present Water Resources Planning Scenario:

The Central Designs Organisation, Nashik has estimated the 75% dependable annual virgin yield of 4451.50 Mcum (157.20 TMC) (April 2004 study) in this sub-basin. Similarly, the average annual virgin yield is estimated as 5467.53 Mcum (193.06 TMC). A large scale irrigation developments and industrial developments have occurred in the sub-basin as explained in para 1.0 of Chapter: 2 and para 1.0 Chapter:3. Large number of major, medium and minor irrigation projects and K.T.weirs, local sector schemes have been planned and completed in this sub-basin. The total design live storage capacity of such projects is 5477.73 Mcum (193.44 TMC) and total design water utilization from these projects is expected as 7174.72 Mcum (253.37 TMC). This design water use is from projects having planned at varying dependabilities ranging from 50% to 75% including local sector schemes more than 5 Mcft water use. The sanctioned non-irrigation uses in this sub-basin are as under:

a)	Domestic use	:	693.09 Mcum
b)	Industrial use	:	283.07 Mcum
	Total	:	976.16 Mcum

The provision for total non-irrigation use in the project planning in this sub-basin is 247.121 Mcum only. It is also observed from the 38 years observed net yield series at Paithan dam (Statement -3) that bad years appear to occur consecutively in 2 years' succession e.g. 1992 & 93, 1995 & 96, whereas consecutively in 3 years' succession e.g. 1985,1986 & 1987, and in 4 years' succession e.g. 2000,2001,2002, 2003 and 2009, 2010, 2011 & 2012. The water deficit is too large to manage.

The water deficit in the sub basin is as under:

(a)	Total design water utilizations	:	7174.72 Mcum
(b)	75% dep. virgin yield (CDO 2004)	:	4451.5 Mcum
(c)	Regeneration from upstream Utilizations (0.075 x4556.12)	:	341.71 Mcum
	Deficit (a – (b +c))	:	2381.51 Mcum
			(84.10 TMC)

This deficit is on account of two reasons namely,;

(a) Increase in upstream utilizations : 1189.09 Mcum

(b) Reduction in yield : 1106.54 Mcum

Total: : 2295.63 Mcum

(81.06 TMC)

The water deficit is creating water stress situation; resulting to water crisis. The water stress situation is creating to the competition and conflict among the different category of uses and among the upper reach and lower reach water users. This type of situation is most likely to occur more frequently in future as the water available is not sufficient to meet the water demands.

The present water stress scenario will have to be managed with a well plan strategy of deficit sharing in respect of a whole sub-basin. There is a need to ensure judicious, equitable allocation and utilizations of available water resources among the different category of uses and among the upper and lower reach water uses, adopting sub-basin as the unit; keeping in mind that sub-basin water resources remain more or less fixed and demands would go on increasing.

The principles laid down in State Water Policy are highlighted in para 9.3 of Chapter: 3. The State Water Policy has adopted the principle of sub-basinwise water recourses planning and sharing of water distress equitably amongst different sectors of water use and also amongst upstream and downstream users. MWRRA Act, 2005 provides a law to regulate and facilitate, ensure judicious and equitable allocation and utilization of water resources at the sub-basin levels. The important sections of this act in this respect are mentioned in para 9.1 and 9.2 of Chapter: 3.

14.0 Water Distress:

Drought is an extended period of months or years when a region notes a deficiency in its water supply whether surface water or ground water. Generally, it occurs when a region receives consistently below average rainfall. Hydrological drought relates to water availability. MWRRA Rules, 2013 defines the word "water scarcity" or "distress". The definition is reproduced in Para 9.2, Chapter: 3 of this report. These two words have been correlated with the actual availability of live storage of the project as on 15th October. The basis for this definition is Govt. of Maharashtra, Water Resources Department's Marathi Resolution No. Misc 10.0/(19/2000)/IM(P) dated 7 March, 2001, in which guidelines for planning of water utilization from water storage are included. In this resolution, it is mentioned that during the expected deficit rainfall year, no sanction for Kharif crop be given until live storage reaches upto 33%.

"Water stress index" is the international level commonly used measures of water scarcity. This method defines water scarcity in terms of the total water resources that are available to the population of a region; measuring scarcity as the amount of renewable freshwater that is available for each person each year. The water

availability per capita per year in a region is below 1700 Cum, it is said to be experiencing water stress; below 1000 Cum it is said to be experiencing water scarcity, and below 500 Cum, absolute water scarcity.

As per Second Maharashtra Water and Irrigation Commission Report, the total population of Upper Godavari (upto Paithan dam) sub-basin was 54.43 lakhs (Census 1991). The growth rate in India is 40.20% between year 1990 to 2010 as per population statistics of United Nations. With this growth rate, the present population (2013) in the sub-basin would be about 78.50 lakhs. The average annual virgin yield is 5467.53 Mcum (CDO Study 2004). The per capita water availability will be 696.5 Cum. It means that the sub-basin is already in water scarcity condition. So the regulation of water resources available in this sub-basin needs to be done to ensure the approximate equitable distribution of water contemplated in MWRRA Act and State Water Policy.

15.0 Operating Strategy for Reservoir Operation :

15.1 Terms of Reference (1): TOR:1 for the study group is to formulate guidelines for integrated operation of reservoirs during the filling period in the sub-basin so that likely water scarcity situation in Paithan dam may not be attained. A lay'man will have answer to the TOR that the release of water from the upper reservoirs may be done to the extent the Paithan reservoir reaches at level with actual live storage equals to or more than 33% of design live storage as on the 15th October. This 33% criterion is developed with the base that the storage facility will atleast satisfy the minimum annual demands of domestic, industrial and evaporation from lake, so that the subsequent (after monsoon season) releases of water from upper reservoirs may not be required. The release of water subsequently after monsoon period will be loss of precious and scarce water resources by way of evaporation and transit losses though long carrier system; without benefitting anybody. The MWRRA Rules, 2013 will have to be interpreted in that context. We have to follow the principles of the approximate equitable and judicious distribution of water contemplated in MWRRA Act and State Water Policy so that the benefits are equally distributed among the different category of uses and among the upper reach and lower reach water users. This has been described in Para 1.0 of Chapter: 2, and 1.0, 9.0,13.0 & 14.0 of Chapter: 3.

15.2 Study Approach : The present water stress situation is most likely to occur more frequently in future as the water resources available in the sub-basin are not sufficient to meet the demands. The present water stress scenario will have to be managed with the well strategy of deficit sharing in respect of a whole sub-basin. Accordingly, the strategy and/or options and their quantitative effects on overall water planning is analyzed in this study by using the approximate equitable concept at sub-basin level to have rational and effective utilization of the water resources.

The river basin simulation approach is generally used to provide an effective tool for better planning and management of water resources in the basin or sub-basin. Lot of computer software packages are available today for analyzing the behavior of the basin under different hydrological conditions. The simulation is usually made over long time series to include the occurrence of dry (bad) and wet (good) periods. Within each time step, the water demands, target for water releases from reservoirs are determined. Then the water is allocated to the users according to the release targets, water availability, operation rules and water allocation priorities.

The present study is done conventionally by adopting general simulation principles without the help of computer software packages. Though, it is possible to simulate the sub-basin scenario on shorter durations, the present study is carried out for time step of a year because of the constraints of limited scope for study group, time period, data availability and limited expertise available in optimization and simulation techniques as well as advance hydrology.

15.3 Study Scope : The operating strategy for integrated operation of reservoirs is to be formulated for whole sub-basin area. The large number of major, medium & minor irrigation projects are planned and completed in this sub-basin. The details regarding their design live storage and water utilizations are given in Statement – 5. The design water use of these projects is about 7174.72 Mcum. This design water use is from projects having planned at varying dependabilities ranging from 50% to 75% including local sector schemes more than 5 Mcft water use. The sanctioned non-irrigation uses in this sub-basin are as below :

a) Domestic use		:	693.09 Mcum
b) Industrial use		:	283.07 Mcum
	Total	:	976.16 Mcum

The details of non-irrigation uses from major & medium projects are given in Statement – 2. There are large number of minor irrigation dams having small size storage and having no regulating spillway gates. No regulation / release is possible through these minor dams unless they are full to their capacities. They are also widely spread in the whole catchment and in large numbers. The operating strategy for integrated operation of reservoirs can not be applied to them, considering the physical and practical constraints. Hence, the water utilizations from these minor projects are not considered for the study. The observed yield data at various Nodes (terminal location) of complex is net after excluding the water used by these minor projects. The study scope is limited to the major & medium projects in the sub-basin. Table: 4 shows the comparison of total complexwise design live storage & water use alongwith present study scope.

Table : 4 Complex wise present study scope

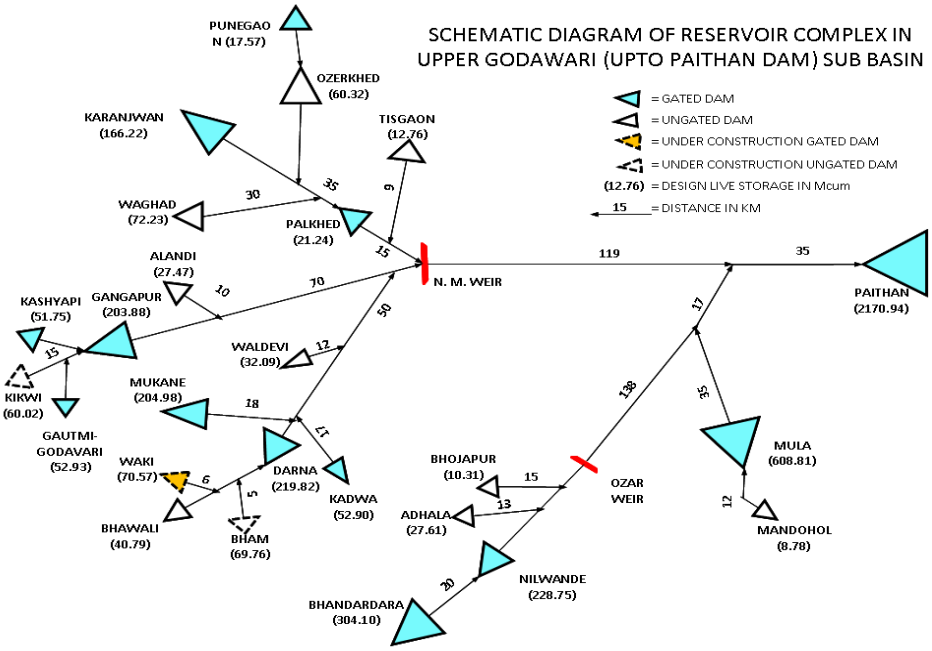
(Figures in Mcum)

Complex	Design Live Storage			Design Water Use		
	Complex	Study scope	%	Complex	Study scope	%
1	2	3	4	5	6	7
A) Mula	708.61	617.59	87.16	829.52	717.78	86.53
B) Pravara	625.83	570.77	91.20	959.91	835.84	87.07
C) Gangapur	419.78	308.56	73.51	405.53	324.81	80.10
D) Godavari - Darna	823.32	718.38	87.25	1390.16	1220.04	87.76
E) Palkhed	379.24	350.34	92.38	505.87	456.52	90.24
F) Remaining upto Paithan dam	350.01	0.00	0.00	465.13	0.00	0.00
Total A to F	*3306.79*	*2565.64*	*77.59*	*4556.12*	*3554.99*	*78.03*
G) Paithan dam	2170.94	2170.94	100.00	2618.59	2618.59	100.00
Total for Sub basin	*5477.73*	*4736.58*	*86.47*	*7174.71*	*6173.58*	*86.05*

The study scope covers the reservoirs having 86% of sub-basin design water use. The dams namely Kikwi (Gangapur complex) and Upper Kadwa (Godavari – Darna complex) are not taken into consideration because they are at the initial stage of planning. Seven (7) medium projects located in "Remaining upto Paithan dam" complex are also not considered for study because they are located in low rainfall zone and this complex is contributing insignificant inflow into the Paithan dam.

Fig.: 11 shows the schematic diagram of reservoir complex which are considered in the present study of Upper Godavari (up to Paithan dam) sub basin.

Fig.11



The study covers 17 Major and 7 Medium Projects including Paithan Dam which are distributed amongst six (6) complex/systems of reservoirs. These reservoirs/dams have been suitably grouped together in the six complex based on the physiography of the river system/systems, water resources developments and hydrologic data availability at Nodes (terminal location).

15.4 Study Scenario: The operating strategy for reservoir operation, will decide the specification of how much water to be stored and released each period, depending on the state of the water availability and water demands in the complex in that period, to best attain a specified goal i.e. approximate equitable distribution of water. So it is decided to consider following 6 scenarios covering different conditions of probabilities of inflows in Paithan dam including the bad year and good year.

(1) 100% dependable year of Paithan dam.

(2) 90% dependable year of Paithan dam.

(3) 75% dependable year of Paithan dam.

(4) 50% dependable year of Paithan dam.

(5) Average yield.

(6) Good year.

Above mentioned probability criterion is based on the performance requirements of the multipurpose projects as prescribed in IS-5477- (Part-I) – 1969 i.e. the project is successful if,;

(1) Domestic requirement is fulfilled for 100% of its life period.

(2) Industrial requirement is fulfilled for 90% of its life period.

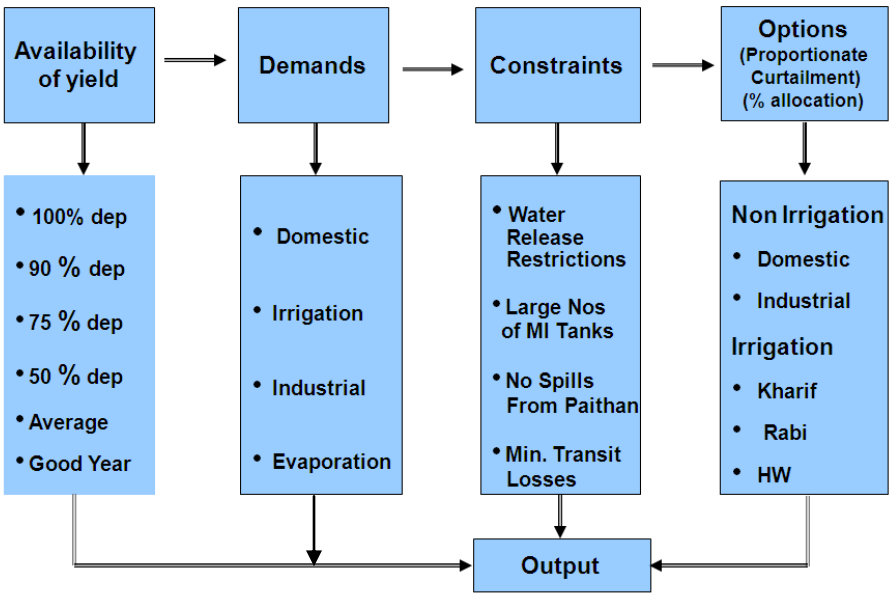
(3) Irrigation requirement is fulfilled for 75% of its life period.

As the sub-basin is in water stress situation, the scenario for 50% dependability, average yield and good year is also decided to be studied. The computation of these scenarios are done to evaluate how the complex would perform if operated in a particular manner under a given set of predetermined conditions, permitting evaluation of the complex under a parameters and variables. The computations are done with the following components:

(1) Water Availability / Yield. (2) Water demands. (3) Reservoir Evaporation (4) Physical constraints (5) Options (6) Operating rules (7) Outputs.

The computation and its components are explained in the Fig.: 12

Fig.12 Study Scenarios



The dependable year of Paithan dam is considered as study year for the whole sub basin, so that the performance of all the complex can be evaluated in realistic approach. The statement – 4 shows the observed yield and corresponding spills at different locations of complex. This data is supplied by the field officers during the study. However, the evaporation and transit losses from the carrier (river) system are not accounted considering the limitations of the study group as explained in earlier para 15.2. The operating strategy for reservoir operation is

proposed to be implemented for releasing of water from Upper dams during the monsoon months (up to October), the losses from the carrier system will be minimal.

The water demands are considered as variable parameter. Taking into account the priorities of water usage as per state water policy, the demands are curtailed and water balance analysis for study year is carried out till the complex perform successfully to meet the variable demands. The statement showing the final out put of a six study scenarios are presented in statement 6 to 11. The output of six scenarios is described briefly below:

(1) **Operating Strategy-I** (100% dependable year of Jayakwadi Project)**:** In this scenario 100% dependable year (2012) of Jayakwadi Project is considered, hence less water is available to meet the various demands. All the demands of all the purposes will not be met in this scenario. Hence, 20% reduction in sanctioned / design demands of (1) domestic use (2) Industrial use and (3) Kharif seasonal crop is contemplated. It will not be possible to provide water for rabi and HW crops in this scenario. (Statement:6).

(2) **Operating Strategy-II** (90% dependable year of Jayakwadi Project) **:** In this scenario 90% dependable year (2003) of Jayakwadi Project is considered, hence less water is available to meet the various demands. All the demands of all the purposes will not be met in this scenario. Hence, 20% reduction in sanctioned / design demands of (1) domestic use (2) Industrial use and (3) Kharif seasonal crop is contemplated. However, it will be possible to provide 32% of rabi demands for protective irrigation. It will not be possible to provide water for HW crops in this scenario (Statement – 7).

(3) **Operating Strategy-III** (75% dependable year of Jayakwadi Project)**:** In this scenario 75% dependable year (1992) of Jayakwadi Project is considered. It is expected that all the design demands should be satisfied in this scenario as projects are designed for 75% dependable yield. However, study indicates that water is not adequate to meet all the design demands. Hence, 20% reduction in sanctioned/design demands of (1) domestic use (2) industrial use and (3) Kharif seasonal crop is contemplated. However, it is planned to provide 52% rabi demands for protective irrigation. It will not be possible to provide water for HW crops in this scenario also (Statement – 8).

(4) **Operating Strategy-IV** (50% dependable year of Jayakwadi Project) **:** In this scenario 50% dependable year (1999) of Jayakwadi Project is considered. It is expected that all the design demands should be satisfied in this scenario as projects are designed for 75% dependable yield. However, study indicates that water is not adequate to meet all the design demands. Hence, 20% reduction in sanctioned/design demands of (1) domestic use (2) Industrial use (3) Kharif seasonal crop is contemplated. However, it will be possible to provide 72% rabi

demands. It will not be possible to provide water for HW crops in this scenario also (Statement – 9).

(5) **Operating Strategy-V** (Average yield)**:** In this scenario average yields in all complex are considered. It is expected that all the design demands should be satisfied in this scenario as projects are designed for 75% dependable yield. However, study indicates that water is not adequate to meet all the design demands. Hence, 20% reduction in sanctioned/design demands of (1) domestic use (2) Industrial use, (3) Kharif use and (4) Rabi use is contemplated. However, it will not be to provide water for HW crops in this scenario also (Statement: 10).

(6) **Operating Strategy – VI** (Good Year) **:** In this scenario good year (2008) of Jaykwadi Project is considered (IS 7323: 1994 – Good year is a year during which the precipitation or stream flow is more than that in the normal year. Normal year, is a year during which the precipitation or stream flow are within Plus (+) 20 percent of the long period average value). The study indicates that water is adequate to meet all the design demands 100% (Statement – 11).

From all above six scenarios, it is seen that the whole sub basin (all the complex) except Good Year scenario fails to satisfy the sanctioned/design water uses. The scenarios support that the sub basin area is experiencing water stress and water scarcity situation is likely to occur more frequently in future. The main reasons for such alarming state can be summarized as under.

(1) Overestimation of water availability at planning stage.

(2) Increase in upstream design (plan) utilizations.

(3) Increase in non-irrigation uses.

The factors like rapid urbanization, high increase in population, change in lifestyle of people and, faster industrial development have compelled to divert more and more water to non-irrigation use irrespective of provisions in project planning. Such a change in allocation at later stage, necessitates the revision of water planning of the projects. The revision of water planning of the projects by way of reviewing the sectoral allocation and thereby reducing for Agriculture use (Irrigation) will create competition and conflict among the water users. Adoption of drip and sprinkler irrigation methods can be made mandatory within a period of 5 years henceforth, as envisaged in Section 14 subsection (4) of MWRRA Act. Government may consider this sub basin as a pilot sub basin for converting the gravity irrigation into micro irrigation system.

15.5 Distribution of Utilizable Water: The six study scenarios are analysed on the principles of the approximate equitable and judicious distribution of available water within the sub basin, so that the benefits of the water are equally distributed among the different category of uses and among the upper and lower reach users. With this

approach, & methodology, the deficits in the sub-basin are shared equitably in proportion with the demands in holistic way. This concept is in line with the rule of equitable apportionment of water mentioned in GWDT award.

The output of the study scenarios give the distribution of utilizable water available in the sub basin among the various complex/systems of reservoirs under different conditions of probabilities of inflows in Paithan dam. Table: 5 shows the output. The water use in the kharif/monsoon period for irrigation or any other purposes including lake evaporation is accountable in utilizable water for that complex.

15.6 Guiding Principles : The output of the six study scenario gives the distribution of utilizable water among the various complex under different inflow conditions. Given the utilizable water for each complex in the sub-basin for the known or predicted availability of inflows, it is possible to specify the set of guiding principles (operating rules) i.e. to specify the riders for synchronization of storages in upper reservoirs with the state of Paithan dam step by step with different end target storages.

Mula, Gangapur and Paithan dam are having carry over storage of 28.32 Mcum, 11.64 Mcum and 381.70 Mcum respectively. The storage left over unused in the reservoir at the end of the depletion period of a year, is available for use in the later years. The requirement of utilizable water for that dam/complex will be less to that extent; if last year carry over is unused because of normal or good year. With this concept, the guiding principles (operating rules) are presented in the Table: 6. Table: 6 gives the step by step synchronization of storages in upper reservoirs with the state of Paithan dam for different operating strategies during filling (monsoon) period.

These guiding principles will limit the reservoir storages/levels in the different systems of reservoirs / complex to be synchronized with the Paithan dam storage during monsoon period. These guiding principles (operating rules) will help for the approximate equitable & judicious distribution of water available among the different category of uses and among the upper & lower reach users. The water deficit will get shared equitably in proportion with the demands. These guiding principles will help for the integrated operation of reservoirs for conservation uses during filling (monsoon) period to achieve the objectives. This operating strategy of integrated operation of reservoirs will mitigate the severity of water stress/ scarcity situation.

Table : 5

Distribution of Utilizable Water Available in the Upper Godavari (upto Paithan dam) Sub-basin among the various complex/systems of Reservoirs under different conditions of Probabilities of Inflows in Paithan dam

Strategy No.	Scenario						Utilizable Water including Kharif/Monsoon Use (Mcum)					
	Complex →						Mula	Pravara	Gangapur	Godavari - Darna	Palkhed	Paithan
	Dams/Systems in complex →						Mandhol, Mula	Bhandardara, Nilwande, Adhala, Bhojapur	Gangapur, Kashyapi, Gautami	Alandi, Kadwa, Bham, Bhawali, Waki, Darna, Mukane, Waldevi	Karanjwan, Waghad, Punegaon, Ojharkhed, Palkhed, Tisgaon	Paithan
	Design Live storage (Mcum) →						617.59	570.77	308.56	718.38	350.34	2170.94
	Carry over (Mcum) →						28.32	0.00	11.64	0.00	0.00	381.70
	Design Water Use (Mcum) →						717.78	835.84	324.81	1220.04	456.52	2618.59
1	2						3	4	5	6	7	8
	Paithan observed Net Inflow at	% Demands										
		D-NI	I-NI	K-I	R-I	HW-I						
1	100% dep. Year	80	80	80	0	0	331.45	320 .33	198 .50	460.69	253.98	1178.67
2	90% dep. Year	80	80	80	32	0	430 .04	425 .38	238.76	604 .00	253.98	1554.62
3	75% dep. Year	80	80	80	52	0	517 .28	500.44	263.61	736.26	287 .41	1790 .43
4	50% dep. Year	80	80	80	72	0	604.56	574.96	288 .43	870 .26	345.36	2027.12
5	Average yield	80	80	80	80	0	639.39	605.16	298.15	917.52	368.54	2119.94
6	Good year	100	100	100	100	100	717.78	835.84	324.81	1220.04	456.52	2618.59

Table : 6

Upper Reservoirs' Storages to be synchronized with the state of Paithan dam storage for different Operating Strategies during filling (Monsoon) period

Operating Strategy	Utilizable Water including Kharif/Monsoon Use excluding carry over (Mcum) (% of Design Live Storage)					
Complex →	Paithan	Mula	Pravara	Gangapur	Godavari - Darna	Palkhed
Dams/Systems in complex →	Paithan	Mandhol, Mula	Bhandardara, Nilwande, Adhala, Bhojapur	Gangapur, Kashyapi, Gautami	Alandi, Kadwa, Bham, Bhawali, Waki, Darna, Mukane, Waldevi	Karanjwan, Waghad, Punegaon, Ojharkhed, Palkhed, Tisgaon
1	2	3	4	5	6	7
Strategy -I	797 (37%)	303 (49%)	320 (56%)	187 (61%)	461 (64%)	254 (73%)
Strategy - II	1173 (54%)	402 (65%)	425 (74%)	227 (74%)	604 (84%)	254 (73%)
Strategy - III	1409 (65%)	489 (79%)	500 (88%)	252 (82%)	736 (102%)	287 (82%)
Strategy -IV	1645 (76%)	576 (93%)	575 (101%)	277 (90%)	870 (121%)	345 (99%)
Strategy - V	1738 (80%)	611 (99%)	605 (106%)	287 (93%)	918 (128%)	369 (105%)
Strategy -VI	2237 (103%)	689 (112%)	836 (146%)	313 (101%)	1220 (170%)	457 (130%)

Above mentioned guiding principles are formulated based on the data supplied by the GMIDC authorities. The review and updating of these principles may be done after lapse of 5 years or shorter period as decided by the Government, taking into account;

(i) Additional data regarding water availability
(ii) Climatic or hydrological changes might have occurred subsequently.
(iii) Technologies for water resources development & management may have changed significantly.
(iv) Difficulties faced in the implementation of the proposed guiding principles.
(v) Changes in water resources planning scenario of sub-basin.

15.7 Key Operating Specifications: The guiding principles of integrated reservoir operation shall give specifications with reference;

(i) Quantity: How much water to be stored and released at upper dams.

(ii) Period: When water to be stored and released at upper dams.

The guiding principles mentioned in above Para 15.6 will give answer to reference (i). The rainfall characteristics of the upper and lower reaches of the sub-basin have been narrated in Para 5.0 of Chapter:3. About 80 to 85% of monsoon rainfall is received by the end of August in upper reaches and whereas in the lower reach areas, the rainfall during the month of September and October is quite predominant. The analysis of observed net yield at Paithan dam (Para 3.4 of Chapter :3) has revealed that inflows in Paithan dam are received predominantly during the month of August to September from upper reach catchments after fulfilling the storage requirements of upper dams and September to October from lower reaches (free catchment). If the upper reservoirs' storages are regulated/synchronized with the state of Paithan dam storage since beginning of monsoon as per the guiding principles of reservoir operation, it will create paradoxical situation. This situation is explained in Fig. 13

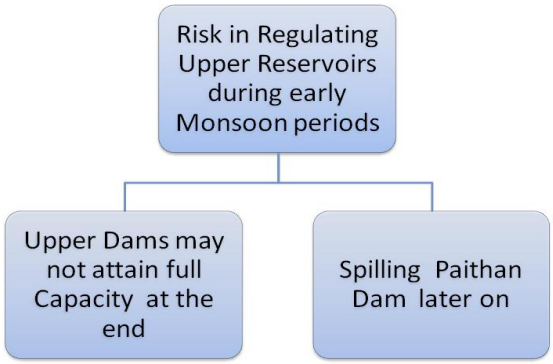


Fig.:13

If the water is released from upper reservoirs in the month of July or August for synchronizing the storage in Paithan dam, and if, Paithan dam becomes full to its capacity and surplus later on due to rains in free catchment in the month of September and October; replenishment of upper storages is not possible. Upper reservoirs may not attain full storage capacity at the end of monsoon. The water can not be transferred from lower to upper reservoirs due to the principles of gravity. GWDT award allows the Maharashtra to use all waters upto Paithan dam on the Godavari river. The spilling of water from Paithan dam without attaining full storage capacity in upper reservoirs, is a loss to the State. Hence, it is logical to regulate the upper reservoirs as per the guiding principles starting from the beginning of September on the basis of assessment of utilizable water available and availability of actual live storage in the individual reservoirs and systems of reservoirs (complex) at the end of August. The release of water for synchronizing the storages in various complex shall be effected in the month of September, and latest by October. If the releases are made in this period, there will be minimal transit losses in the carrier system. This answers reference (ii) above.

16.0 Real Time Integrated Operation of Reservoirs:

Water which was once considered as abundant and has now become a scarce and economic resource. There is a water stress situation in Upper Godavari (upto Paithan dam) sub-basin. The water resources management is challenging task because of the ever increasing demands. There is a urgent need for conservation of available water resources and its judicious, equitable distribution among the different category of uses and among the stakeholders, using scientific approach.

At present, the water resources projects are mostly operated and managed considering them as a single entity, instead of attempting integrated operation for deriving optimum and equitable benefits. The operation of reservoirs based on semi-rigid operation rules, which are developed taking into account the various demands and historic / synthetic time series inflow data, often poses difficulties in making appropriate reservoir release decisions due to uncertainty in the probability of occurrence of inflows. Integrated operation of reservoirs in systems of reservoirs become an operation in real time in which water control decisions have to be taken at each instant of time.

The current water demands for various purposes, the available storage in individual reservoirs and the distribution of utilizable water available among the reservoirs and among the various complex will have to be considered to develop a co-ordinated plan to produce the optimum benefits and minimize water losses due to evaporation and transmission. In the reservoir complex, since more number of reservoirs are involved, the regulation schedules for reservoirs operated as part of the complex should be prepared separately for each reservoir, based on the integrated plan of operation of reservoirs. Then, the independent schedules/ estimates should be simulated with a hypothetical operation of the complex, to ensure that complex targets are satisfied, project objectives are maximized and an

equitable distribution of water within the complex/systems of reservoirs is maintained.

In Upper Godavari (upto Paithan dam) sub-basin, the reservoir operation will involve a large number of stakeholders with different category of uses such as domestic, irrigation, industry, hydropower and flood control. Thus, optimization of reservoir operation will be complex, multi-purpose optimization problem where equitable solutions between the often conflicting category of uses are required. Real time operation will help in avoiding the situation of spilling from Paithan dam at the state when the upper reservoirs are not full to their capacities. It is felt necessary to develop the computer based techniques and applications of system engineering techniques for real time integrated operation of reservoirs with the real time data acquisition system (RTDAS) and flood forecasting model in the Upper Godavari (upto dam) sub-basin immediately. This will require the financial provision of about Rs. 50 crores.

17.0 Mechanism for Effective Implementation:

Terms of Reference (2) for the study group is to develop mechanism for the effective implementation of the guiding principles. The concept of operation of reservoirs considering it as a single entity has to be give way to the concept of integrated reservoir operations in the sub-basin. In the Upper Godavari (upto Paithan dam) sub-basin, there are seven (7) complex/systems of reservoirs. In the reservoir complex, since more number of reservoirs / dams are involved, the decision regarding operation of reservoirs would be taken at higher level than authority competent for operation of individual reservoir system. Generally, the authority of the entire catchment will be authority responsible for the integrated operation of reservoirs in the sub-basin. In this sub-basin, the Executive Director, Godavari Marathwada Irrigation Development Corporation (Godavari Marathwada RBA) will be the authority who would be responsible for operation of all complex and Decision Support System so developed shall be placed under him.

A Godavari Reservoirs Regulation Group may be established permanently which will be responsible for the operation of reservoirs in the entire sub-basin. The concerned Chief Engineers, Superintending Engineers and CAD Administrators will be the members of the Group. The Group is expected to consult and/or meet frequently in monsoon period for assessment of water availability and review, and take decision for the integrated operation of reservoirs in the sub-basin with more coordinated approach.

18.0 Conclusions :

The discussions were held on 23 July, 2013 at Vidhan Bhavan building, Mumbai in presence of Hon. Minister, Water Resources (excluding MKVDC), Principal Secretary (WRM & CAD), Principal Secretary (WRP&D) and Study Group

members . During the discussions, the Chairman presented the present water resources planning scenario in Upper Godavari (upto Paithan dam) sub-basin alongwith the operating strategies for integrated operation of reservoirs. The scope of Terms of Reference: 1 (TOR:1) was also discussed. The majority of the study group members are of the view that the scope of TOR:1 limits the study for formulation of guidelines for integrated operation of reservoirs to the extent not to attain likely scarcity situation in the Paithan dam. The water scarcity is defined in MWRRA Rules, 2013. It means that the TOR:1 is limiting the operating strategy of reservoir operation for the release of water from the upper reservoirs be done to the extent the Paithan reservoir reaches at level with actual live storage equals to 33% of design live storage as on the 15th October.

The Chairman of the study group differs for limiting the operating strategy of reservoir operation. In Upper Godavari (up to Paithan dam) sub-basin ,the present water resources planning scenario indicates that sub-basin is in water deficit. The water deficit is creating water stress situation; resulting to water crisis. The water stress situation is creating to the competition and conflict among the different category of uses and among the upper reach and lower reach water users. This type of situation is most likely to occur more frequently in future as the water available is not sufficient to meet the water demands. The water stress situation/scenario in the sub-basin is required to be managed with a well plan strategy of deficit sharing to ensure the approximate equitable and judicious distribution of available water resources as contemplated in MWRRA Act, 2005 and State Water Policy, adopting sub-basin as the unit. This is also described in Para 15.1 of Chapter: 3.

In the meeting of 23 July, 2013, it was suggested from the Government side that the study group shall suggest the guiding principles on integrated operation of reservoirs in two phases as under :

(1) **Phase-I (Short Term Measures) :** In short term measures, the guidelines are to be formulated to the extent not to attain likely scarcity situation in Paithan dam.

(2) **Phase-II (Long Term Measures) :** In long term measures, the guiding principles on integrated operation of reservoirs are to be suggested with a well plan strategy of deficit sharing to ensure the approximate equitable and judicious distribution of available water resources as contemplated in MWRRA Act, 2005 and State Water Policy, adopting sub-basin as the unit.

The Chairman of the study group has requested to the Government vide marathi letter no. WALMI/Est-1/2311 dated 31 July, 2013 for clarifying the scope of TOR:1 (Appendix -5). The Government vide marathi letter no. Misc-2012/ (891/12)/2012/IM(P) dated 6 August, 2013 (Appendix -6) has clarified that the study group shall submit the report based on the suggestions made in the meeting of 23 July, 2013.

The major source of sub-basin yield is in the upper reach catchment where large number of major and medium dams have been constructed for water conservation purposes; most of them were planned in earlier periods. Hence, the study group is of the view that the water utilizations in upper reach need to be given with some latitude compared with lower reach. Hence, it is recommended that one up-step may be given to upper reservoirs' storages to be synchronized with the state of Paithan dam storage for different operating strategies during filling (monsoon) period. With this recommendation, the guiding principles (operating rules) are presented in the Table: 7. It is included in the "Recommendations" (Chapter: 4). This will help to ensure the judicious distribution of available water resources among the upper reach and lower reach water users.

Based on the discussions narrated in this Chapter, the study group presents the recommendations in two Phases i.e. Phase-I (Short Term Measures) and Phase-II (Long Term Measures) in Chapter: 4.

Chapter: 4

RECOMMENDATIONS

Based on the discussions and conclusions narrated in Chapter: 3, the Study Group presents the following recommendations in two phases on the **Terms of Reference:**

1.0 Phase-I (Short Term Measures):

1.1 Regulate the upper reservoirs during filling (monsoon) period based on the strategy for integrated operation of reservoirs with coordinated approach at Upper Godavari (upto Paithan dam) sub-basin level in such a way that likely water scarcity situation may not be attained in Paithan reservoir.

1.2 The upper reservoirs shall be regulated starting from the beginning of September on the basis of assessment of utilizable water available, rainfall forecast and availability of actual live storage in the individual reservoirs and systems of reservoirs (complex) at the end of August. The release of water from the various complex shall be effected in the month of September and latest by 15th October so that the Paithan reservoir reaches at the level with actual live storage equals to or more than 33% of design live storage as on the 15th October.

1.3 The guiding principles (operating rules) for operating strategy-I presented in Table: 6 shall be followed for releasing water proportionally from the various complex.

1.4 Kharif irrigation requirement to the extent of crop water requirement worked out scientifically taking into consideration the conjunctive ground water use, shall be met with from utilizable water from the respective systems of reservoirs/complex.

1.5 Diversion of monsoon flows through canals, flood canals and rivers/streams for kharif use out of project command area, feeding tanks, farm ponds etc. shall be allowed only after Paithan reservoir level reaches to its full capacity.

1.6 Above ground surface storages/ water bodies may not be created in this sub-basin henceforth.

2.0 Phase-II (Long Term Measures) :

2.1 The water stress situation/scenario in Upper Godavari (upto Paithan dam) sub-basin is required to be managed with a well plan strategy of deficit sharing to ensure the approximate equitable and judicious distribution of available water resources as contemplated in MWRRA Act, 2005 and State Water Policy, adopting sub-basin as the unit.

2.2 Develop computer based techniques and applications of system engineering techniques with the technical assistance of national/ international Institutes or Consultants for real time integrated operation of reservoirs with the real time data acquisition system (RTDAS) and flood forecasting model in the Upper Godavari (upto dam) sub-basin within a period of 2 years. This will require the financial provision of about Rs. 50 crores.

2.3 Once the Decision Support System as recommended in Para 2.2 above is in place and operative, then the strategy for integrated operation of all the major and medium project reservoirs shall be adopted in the systems of reservoirs/complex during filling (monsoon) period on the following guiding principles (operating rules) in Upper Godavari (upto Paithan dam) sub-basin.

Guiding Principles:

(1) The distribution of utilizable water available in the sub-basin including Kharif (monsoon) use shall be done among the various complex/systems of reservoirs for the known or predicted availability of inflows by implementing step by step synchronization of storages in upper reservoirs with the state of Paithan dam storage for different operating strategies during filling (monsoon) period. Table : 7 presents the operating rules for the step by step synchronization of storages in various complex under different operating strategies.

(2) Regulate the upper reservoirs as per the operating rules (guiding principles) starting from the beginning of September on the basis of assessment of utilizable water available, rainfall forecast and availability of actual live storage in the individual reservoirs and systems of reservoirs (complex) at the end of August. The release of water for synchronizing the storages in various complex shall be effected in the month of September and latest by October.

(3) There will be no reservoir regulation for gated (spillway) dams in upper reach until the live storage reaches upto 53% of design live storage.

Table : 7

Upper Reservoirs' Storages to be synchronized with the state of Paithan dam storage for different Operating Strategies during filling (Monsoon) period (one up-step)

Operating Strategy (one up-step)	Utilizable Water including Kharif/Monsoon Use excluding carry over (Mcum) (% of Design Live Storage)					
Complex →	Paithan	Mula	Pravara	Gangapur	Godavari - Darna	Palkhed
Dams/Systems in complex →	Paithan	Mandhol, Mula	Bhandardara, Nilwande, Adhala, Bhojapur	Gangapur, Kashyapi, Gautami	Alandi, Kadwa, Bham, Bhawali, Waki, Darna, Mukane, Waldevi	Karanjwan, Waghad, Punegaon, Ojharkhed, Palkhed, Tisgaon
1	2	3	4	5	6	7
Strategy - I	797 (37%)	402 (65%)	425 (74%)	227 (74%)	604 (84%)	254 (73%)
Strategy - II	1173 (54%)	489 (79%)	500 (88%)	252 (82%)	736 (102%)	287 (82%)
Strategy -III	1409 (65%)	576 (93%)	575 (101%)	277 (90%)	870 (121%)	345 (99%)
Strategy - IV	1645 (76%)	611 (99%)	605 (106%)	287 (93%)	918 (128%)	369 (105%)
Strategy -V	1738 (80%)	689 (112%)	836 (146%)	313 (101%)	1220 (170%)	457 (130%)

(4) Review and updating of operating rules (guiding principles) as presented in Table: 7 may be done after lapse of 5 years or at shorter period as decided by the Government, taking into account the difficulties faced in the implementation and changes in water planning scenario of sub-basin.

2.4 A Godavari Reservoirs Regulation Group shall be established permanently headed by the Executive Director, GMIDC (RBA), Aurangabad. The concerned Chief Engineers, Superintending Engineers and CAD Administrators will be the members of the Group. This Group shall be responsible for the operation of reservoirs in the entire sub-basin. The Group is expected to consult and/or meet fortnightly or more frequently in monsoon period for assessment of water availability and review, and take decisions for the integrated operation of reservoirs in the sub-basin on the basis of principles given in above para 2.1, 2.2 and 2.3 with more coordinated approach.

2.5 During the period of floods, the normal reservoir conservation regulation shall be switched over to the flood moderation regulation.

2.6 Kharif irrigation requirement to the extent of crop water requirement worked out scientifically taking into consideration the conjunctive ground water use, shall be met with from utilizable water from the respective systems of reservoirs/complex.

2.7 Diversion of monsoon flows through canals, flood canals and rivers/streams for kharif use out of project command area, feeding tanks, farm ponds etc except diversion to Majalgaon reservoir, shall be allowed only after Paithan reservoir level reaches to its full capacity.

2.8 The carry over storage is a additional storage capacity provided within the live storage to meet shortages during the bad years .Such storage shall not be used during good years and normal years

2.9 Adoption of drip and sprinkler irrigation methods for increasing water use efficiency may be made mandatory within a period of 5 years henceforth, as envisaged in Section 14 subsection (4) of MWRRA Act. Government may consider this sub basin as a pilot sub basin for converting the gravity irrigation into micro irrigation system.

2.10 It is suggested to provide a river sluice in the body of dam for all major and medium projects to regulate reservoir operations during monsoon period in systems of reservoirs/complex.

This Report is brought out unanimously by the Study Group.

(A.P.Kohirkar)
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Aurangabad and Member Secretary

(B.C.Kunjir)
Chief Engineer,NMR,WRD,
Nashik and Member

(E.B.Jogdand)
Chief Engineer & Chief Administrator,
CAD, WRD, Aurangabad and
Special Invitee Member

(H.K.Gosavi)
Chief Engineer, Planning & Hydrology,
Nashik and Member

(C.A.Birajdar)
Chief Engineer (SP),WRD,
Pune and Member

(A.B.Patil)
Executive Director, GMIDC,
Aurangabad and Special Invitee Member

(H.T.Mendhegiri)
Director General, WALMI,
Aurangabad and Chairman

Statement - 1

Statement showing live storage below and above crest of spillway in various gated upstream dams of Upper Godavari (up to Paithan dam) sub - basin

Sr. No.	Name of dam	Type of overflow section	Live Storage in Mcum	Live storage below crest of spillway in Mcum	Live storage above crest of spillway in Mcum	% of live storage below crest of spillway	Mandatory live storage	
							Percentage	Storage in Mcum
1	Mula	Gated	608.81	271.56	337.25	45	53	322.67
2	Bhandardara	Gated	304.1	182.41	121.69	60	53	161.17
3	Nilwande	Gated	228.75	178.02	50.73	78	53	121.24
4	Gautami	Gated	52.93	41.25	11.68	78	53	28.05
5	Kashypi	Gated	51.75	37.17	14.58	72	53	27.43
6	Gangapur	Gated	203.88	66.87	137.01	33	53	108.06
7	Kadwa	Gated	52.9	13.67	39.23	26	53	28.04
8	Darna	Gated	219.82	114.75	105.07	52	53	116.50
9	Mukane	Gated	204.98	120.29	84.69	59	53	108.64
10	Karanjwan	Gated	166.22	91.56	74.66	55	53	88.10
11	Punegaon	Gated	17.57	4.375	13.195	25	53	9.31
12	Palkhed	Gated	21.24	2.248	18.992	11	53	11.26
13	Waki	Gated	70.57	45.77	24.8	65	53	37.40
		Total	2203.52	1169.943	1033.577	53	53	1167.87

Statement - 2

Statement showing Non Irrigation Use from major and medium projects in Upper Godavari (up to Paithan dam) sub - basin

Sr. No.	Name of Dam	NI provision in project report in Mcum	Domestic Use (Mcum)		Industrial Use (Mcum)		Total(Mcum)	
			Sanctioned	Actual (2011-12)	Sanctioned	Actual (2011-12)	Sanctioned	Actual (2011-12)
1	Mandhol	0.00	1.23	0.00	0.00	0.00	1.23	0.00
2	Mula	59.12	95.27	43.78	15.09	3.49	110.36	47.27
3	Bhandardara	0.00	43.33	24.89	23.42	23.42	66.75	48.31
4	Nilwande	13.15	13.15	0.00	0.00	0.00	13.15	0.00
5	Adhala	0.00	3.32	2.85	0.00	0.00	3.32	2.85
6	Bhojapur	0.00	2.29	2.34	0.00	0.00	2.29	2.34
7	Gautami	0.00	20.81	0.02	0.00	0.00	20.81	0.02
8	Gangapur and Kashypi	36.79	110.40	140.99	55.56	24.97	165.96	165.96
9	Alandi	0.00	0.00	0.00	0.06	0.03	0.06	0.03
10	Kadwa	0.60	18.00	1.92	0.00	0.00	18.00	1.92
11	Darna	0.00	54.30	37.43	7.13	3.74	61.43	41.17
12	Mukane	72.16	19.68	1.10	2.59	0.66	22.27	1.76
13	Waldevi	0.00	0.12	0.00	12.18	3.80	12.30	3.80
14	Karnjwan	0.00	0.00	0.00	1.10	0.38	1.10	0.38
15	Ojharkhed	1.27	3.19	1.93	0.25	0.53	3.44	2.46
16	Palkhed	19.38	23.81	66.51	4.95	1.82	28.76	68.33
17	Tisgaon	0.00	0.92	0.43	0.00	0.00	0.92	0.43
	Total 1 to 17	**202.47**	**409.82**	**324.19**	**122.33**	**62.84**	**532.15**	**387.03**
18	Paithan	0.00	283.27	101.65	160.74	56.57	444.01	158.22
	Grand total	**202.47**	**693.09**	**425.84**	**283.07**	**119.41**	**976.16**	**545.25**

Statement - 3

Annual observed net yield series at Paithan dam for the period from 1975to 2012

Sr.No.	Year	Annual yld (Mcum)	Year	Annual yld in descending order (Mcum)	Dependable yield in Mcum		
					Dep.	Yield in Mcum	Year
1	1975	4296.07	2006	7889.13			
2	1976	7235.58	1976	7235.58			
3	1977	2557.31	1990	4842.58			
4	1978	1446.54	2005	4589.72			
5	1979	4521.87	1979	4521.87			
6	1980	3552.90	1975	4296.07			
7	1981	3776.92	1994	4251.18			
8	1982	1810.04	1983	4023.39			
9	1983	4023.39	1981	3776.92			
10	1984	1486.84	1980	3552.90			
11	1985	701.77	2008	3033.00			
12	1986	739.84	1998	2853.93			
13	1987	831.32	1991	2836.90			
14	1988	2592.78	2007	2660.00			
15	1989	2142.24	1988	2592.78			
16	1990	4842.58	1977	2557.31			
17	1991	2836.90	2004	2485.63			
18	1992	801.74	1989	2142.24			
19	1993	1338.87	1999	2067.51	50%	2067.51	1999
20	1994	4251.18	1982	1810.04			
21	1995	382.68	1984	1486.84			
22	1996	1138.86	1997	1475.72			
23	1997	1475.72	1978	1446.54			
24	1998	2853.93	1993	1338.87			
25	1999	2067.51	2010	1275.00			
26	2000	729.20	1996	1138.86			
27	2001	562.56	2011	1134.00			
28	2002	408.49	1987	831.32			
29	2003	558.86	1992	801.74	75%	816.53	1992
30	2004	2485.63	1986	739.84			
31	2005	4589.72	2000	729.20			
32	2006	7889.13	1985	701.77			
33	2007	2660.00	2001	562.56			
34	2008	3033.00	2003	558.86			
35	2009	388.00	2002	408.49	90%	528.79	2003
36	2010	1275.00	2009	388.00			
37	2011	1134.00	1995	382.68			
38	2012	122.05	2012	122.05	100%	122.05	2012
					Average=	2356.34	

Statement - 4

Statement showing Observed yield and corresponding spills at dependable year of Jayakwadi project .

(Figures in Mcum)

Sr. No.	Name of dam/ complex	Annual yield						Spills					
		1999	1992	2003	2012	Average	Good year 2008	1999	1992	2003	2012	Average	Good year 2008
1	Mandhol	10.29	55.88	3.61	2.81	16.67	18.30						
2	Mula	695.82	368.94	443.49	527.62	801.33	937.17	29.17	0.00	0.00	0.00	151.69	197.54
3	Ozer weir(virgin)	651.00	515.14	613.45	550.00	701.68	796.66	172.25	52.59	122.04	2.46	233.86	
4	Gangapur	278.74	243.07	347.24	224.82	350.66	477.91						153.1
5	N.M. Weir(virgin)	1147.50	687.74	2379.26	1356.87	1385.74	3175.09	121.51	37.58	1056.06	249.39	750.78	1863.88
6	Karanjwan	166.22	128.47	156.85	108.54	175.49	215.97						
	Waghad	83.76	101.26	82.09	78.47	95.52	102.45						
	Punegaon	7.87	N.C.	15.91	38.09	20.97	67.14						
	Ojharkhed	62.32	76.82	49.24	32.88	67.88	112.98						
	Palkhed	22.51	207.86	69.54	83.71	167.80	261.47						
	Tisgaon	6.80	N.C.	11.27	3.04	16.22	19.75						
	Total Palkhed	**349.48**	**514.41**	**384.90**	**344.73**	**543.88**	**779.76**	**0.00**	**105.81**	**20.55**	**14.45**	**75.09**	**170.34**
7	Paithan	2067.51	816.53	528.79	122.05	2356.34	3033.00						

N.C. - Not completed

Statement - 5

Statement showing the Live Storage and Water Utilisations of irrigation projects in Upper Godavari (upto Paithan dam) Sub basin

(Figures in Mcum)

Sr.No.	Name of Dam and Complex	Design Live Storage				Design Water Use			
		Major	Medium	Minor	Total	Major	Medium	Minor	Total
1	2	3	4	5	6	7	8	9	10
A	**Mula Complex**								
1	Mandohal dam		8.78		8.78		13.15		13.15
2	Mula Dam	608.81			608.81	704.63			704.63
3	M.I.& KT weirs.(State) (35 Nos.)			76.80	76.80			76.80	76.80
4	Local Sector (46 Nos.)			14.22	14.22			14.22	14.22
5	Sanctioned Kharif use on Reservoir and River							20.72	20.72
	Total for Complex	**608.81**	**8.78**	**91.02**	**708.61**	**704.63**	**13.15**	**111.74**	**829.52**
B	**Pravara Complex**								
1	Bhandardara dam	304.10			304.10	434.64			434.64
2	Nilwande dam	228.75			228.75	351.77			351.77
3	Adhala dam		27.61		27.61		38.73		38.73
4	Bhojapur dam		10.31		10.31		10.70		10.70
5	M.I.(State) (5 Nos)			19.56	19.56			23.56	23.56
6	Bhojapur Flood canals							7.12	7.12
7	M.I. (Local.Sector.) (86 Nos)			35.50	35.50			35.50	35.50
8	Sanctioned Kharif use on Reservoir and River							57.89	57.89
	Total for Complex	**532.85**	**37.92**	**55.06**	**625.83**	**786.41**	**49.43**	**124.07**	**959.91**
C	**Gangapur Complex**								
1	Kikwi dam (under construction)		60.02		60.02		45.21		45.21
2	Guatami Godavari dam		52.93		52.93		54.68		54.68
3	Kasyapi dam		51.75		51.75		55.31		55.31
4	Gangapur dam	203.88			203.88	169.61			169.61
5	M.I.(State) (7 Nos.)			26.66	26.66			26.66	26.66
6	Local Sector (69 Nos.)			24.54	24.54			24.54	24.54
7	Sanctioned Kharif use on Reservoir and River							29.52	29.52
	Total for Complex	**203.88**	**164.70**	**51.20**	**419.78**	**169.61**	**155.20**	**80.72**	**405.53**

Sr.No.	Name of Dam and Complex	Design Live Storage				Design Water Use			
		Major	Medium	Minor	Total	Major	Medium	Minor	Total
1	2	3	4	5	6	7	8	9	10
D	**Godavari - Darna Complex**								
1	Alandi dam		27.47		27.47		40.67		40.67
2	Upper Kadwa dam (proposed)		13.69		13.69		17.18		17.18
3	Kadwa dam	52.90			52.90	80.70			80.70
4	Bham dam (under construction)	69.76			69.76	8.78			8.78
5	Bhawali dam	40.79			40.79	18.64			18.64
6	Waki dam (under construrction)	70.57			70.57	12.85			12.85
7	Darna dam	219.82			219.82	47.89			47.89
8	Mukane dam	204.98			204.98	102.46			102.46
9	Waldevi dam		32.09		32.09		20.76		20.76
10	N.M.weir								
	a) N M Express canal					445.05			445.05
	b) Godavari canals					442.24			442.24
	c) Transit and Evaporation Losses					45.88			45.88
11	M.I.(State) (27 Nos.)			89.73	89.73			96.32	96.32
12	Local Sector (5 Nos.)			1.52	1.52			1.52	1.52
13	Sanctioned Kharif use on Reservoir and River							9.22	9.22
	Total for Complex	**658.82**	**73.25**	**91.25**	**823.32**	**1204.49**	**78.61**	**107.06**	**1390.16**
E	**Palkhed Complex**								
1	Karanjwan dam	166.22			166.22	24.92			24.92
2	Waghad dam	72.23			72.23	46.29			46.29
3	Punegaon dam	17.57			17.57	0.00			0.00
4	Ozarkhed dam	60.32			60.32	105.29			105.29
5	Palkhed dam	21.24			21.24	279.18			279.18
6	Tisgaon system	12.76			12.76	0.84			0.84
7	M.I.(State) (8 Nos.)			19.69	19.69			19.69	19.69
8	Local Sector (23 Nos.)			9.21	9.21			9.21	9.21
9	Sanctioned Kharif use on Reservoir and River,							20.45	20.45
	Total for Complex	**350.34**	**0.00**	**28.90**	**379.24**	**456.52**	**0.00**	**49.35**	**505.87**

Sr.No.	Name of Dam and Complex	Design Live Storage				Design Water Use			
		Major	Medium	Minor	Total	Major	Medium	Minor	Total
1	2	3	4	5	6	7	8	9	10
F	**Remaining upto Paithan dam**								
1	Below Mula dam								
	M.I.& KT weirs (State) (7 Nos.)			14.15	14.15			14.15	14.15
2	Below NM weir								
	a) KT weirs (state) (12 Nos.)			60.22	60.22			60.22	60.22
	b) MI Tanks (State) (1 No.)			1.34	1.34			1.34	1.34
3	Below Ozer weir								
	a) M.I.(State) (2 N0s)			2.51	2.51			3.56	3.56
	b) K.T. weir (State) (12 Nos.)			28.38	28.38			28.38	28.38
4	Tembhapuri dam		19.61		19.61		22.13		22.13
5	Dheku dam		12.17		12.17		13.53		13.53
6	Kolhi dam		3.24		3.24		3.95		3.95
7	Narangi dam		11.50		11.50		13.30		13.30
8	Bor Dahegaon dam		11.47		11.47		15.10		15.10
9	Ambadi dam		9.42		9.42		12.76		12.76
10	Shivana Takli dam		37.06		37.06		44.22		44.22
11	MI(State) (41 Nos.)			94.94	94.94			103.49	103.49
12	MI (L.S.) (172 Nos.)			44.00	44.00			44.00	44.00
13	Bramhagavan LIS II							85.00	85.00
	Total for Complex	**0.00**	**104.47**	**245.54**	**350.01**	**0.00**	**124.99**	**340.14**	**465.13**
	Grand Total (A to F)	**2354.70**	**389.12**	**562.98**	**3306.79**	**3321.66**	**421.38**	**813.08**	**4556.12**
G	**Paithan dam**	**2170.94**			**2170.94**	**2618.59**			**2618.59**
	a) Tajnapur LIS I (45.77 Mcum)								
	b) Bramhagavan LIS I (27.518 Mcum)								
	c) Tajnapur LIS II (63.977 Mcum)								
	d) Individual lifts on Reservoir and River (64.88 Mcum)								
	Grand Total for Sub basin	**4525.64**	**389.12**	**562.98**	**5477.73**	**5940.25**	**421.38**	**813.08**	**7174.71**

Statement - 6

Statement showing the Water Planning in Upper Godavari (up to Paithan dam) Sub basin considering 100 % dependable year of Jayakwadi Project

(Figures in Mcum)

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2012	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Mandhol	Ungated	2.81	2.52	8.78	8.78	0.98	0.00	3.45	0.00	0.00	4.43	1.43	5.86	13.15		
2	Mula - Spills	Gated	527.62	127.42	608.81	322.67	76.22	12.07	134.75	0.00	0.00	223.04	59.53	282.57	704.63		
	Total for complex		**530.43**	**129.94**	**617.59**	**331.45**	**77.20**	**12.07**	**138.20**	**0.00**	**0.00**	**227.47**	**60.96**	**288.43**	**717.78**	**242.00**	**198.98**
3	Bhandardara	Gated		8.50	304.10	161.17	34.66	18.74	94.24	0.00	0.00	147.64	13.14	160.78	434.64		
4	Nilwande	Gated		7.25	228.75	121.24	10.52	0.00	102.53	0.00	0.00	113.05	10.44	123.49	351.77		
5	Adhala	Ungated		2.42	27.61	27.61	2.66	0.00	10.55	0.00	0.00	13.21	3.12	16.33	38.73		
6	Bhojapur	Ungated		3.03	10.31	10.31	1.83	0.00	0.77	0.00	0.00	2.60	1.36	3.96	10.70		
7	Ozer Weir- spills	Ungated	547.54														
	Total for complex		**547.54**	**21.20**	**570.77**	**320.33**	**49.67**	**18.74**	**208.09**	**0.00**	**0.00**	**276.50**	**28.06**	**304.56**	**835.84**	**242.98**	**227.21**
8	Gautami	Gated		0.32	52.93	28.05	16.65	0.00	11.12	0.00	0.00	27.77	2.81	30.58	54.68		
9	Kashypi	Gated		0.95	51.75	27.43	0.00	0.00	6.14	0.00	0.00	6.14	2.02	8.15	55.31		
10	Gangapur	Gated	224.82	12.00	203.88	108.06	88.32	44.45	0.00	0.00	0.00	132.77	27.00	159.77	214.82		
	Total for complex		**224.82**	**13.27**	**308.56**	**163.54**	**104.97**	**44.45**	**17.26**	**0.00**	**0.00**	**166.67**	**31.83**	**198.50**	**324.81**	**26.32**	**26.32**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2012	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11	Alandi	Ungated		2.06	27.47	27.47	0.00	0.05	7.93	0.00	0.00	7.98	3.41	11.39	40.67		
12	Kadwa	Gated		6.68	52.90	28.04	14.40	0.00	24.43	0.00	0.00	38.83	8.96	47.78	80.70		
13	Bham	Ungated		5.66	69.76	69.76	0.00	0.00	0.00	0.00	0.00	0.00	2.22	2.22	8.78		
14	Bhawali	Ungated		3.96	40.79	40.79	0.00	0.00	3.09	0.00	0.00	3.09	1.35	4.44	18.64		
15	Waki	Gated		5.23	70.57	37.40	0.00	0.00	0.00	0.00	0.00	0.00	4.62	4.62	12.85		
16	Darna	Gated		7.05	219.82	116.50	43.44	5.70	4.54	0.00	0.00	53.68	30.52	84.20	47.89		
17	Mukane	Gated		9.18	204.98	108.64	15.74	2.07	0.52	0.00	0.00	18.34	22.27	40.61	102.46		
18	Waldevi	Ungated		1.92	32.09	32.09	0.10	9.74	5.58	0.00	0.00	15.42	4.04	19.45	20.76		
19	N.M Express canal						0.00	0.00	103.25	0.00	0.00	103.25		103.25	445.05		
20	Godavari canals						0.00	0.00	76.48	0.00	0.00	76.48		76.48	442.24		
21	NM Weir- Spills		1107.48														
	Total for complex		**1107.48**	**41.74**	**718.38**	**460.69**	**73.68**	**17.57**	**225.81**	**0.00**	**0.00**	**317.05**	**77.38**	**394.44**	**1220.04**	**713.04**	**646.79**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2012	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22	Karanjwan	Gated	108.54	9.34	166.22	88.10	0.00	0.88	2.25	0.00	0.00	3.13	4.62	7.75	24.92		
23	Waghad	Ungated	78.47	4.25	72.23	72.23	0.00	0.00	9.85	0.00	0.00	9.85	1.93	11.78	46.29		
24	Punegaon	Gated	38.09	2.81	17.57	9.31	0.00	0.00	2.81	0.00	0.00	2.81	0.60	3.41	0.00		
25	Ojharkhed	Ungated	32.88	7.64	60.32	60.32	2.55	0.20	15.54	0.00	0.00	18.29	2.25	20.54	105.29		
26	Palkhed	Gated	83.71	1.77	21.24	11.26	19.05	3.96	63.70	0.00	0.00	86.70	2.20	88.90	279.18		
27	Tisgaon	Ungated	3.04	2.70	12.76	12.76	0.74	0.00	2.75	0.00	0.00	3.49	0.87	4.36	0.84		
28	Spills		-14.45														
	Total for complex		**330.28**	**28.51**	**350.34**	**253.98**	**22.34**	**5.04**	**96.89**	**0.00**	**0.00**	**124.26**	**12.48**	**136.74**	**456.52**	**193.54**	**76.30**
29	**Paithan**	**Gated**	**122.05**	**738.10**	**2170.94**	**0.00**	**226.62**	**128.59**	**427.72**	**0.00**	**0.00**	**782.93**	**395.74**	**1178.67**	**2618.59**	**118.98**	**-1175.60**
	Grand Total		**2862.60**	**972.76**	**4736.58**	**1529.99**	**554.47**	**226.46**	**1113.96**	**0.00**	**0.00**	**1894.89**	**606.45**	**2501.34**	**6173.58**		

Notes :

1) Mandatory live storage is as per statement no 1,considering the spillway release restrictions
2) Yield is calculated after deducting spills from observed yield for Mula (Zero Mcum), Ozar weir (2.46 Mcum), N M Weir(249.39 Mcum), Palkhed (14.45 Mcum)
3) Non Irrigation water demands are considered at 80% ,as sanctioned demands account for future demands.
4) Irrigation demands are considered at 80 % of design use taking into account the efficient use of water .
5) For 100% dependable year, If the Rabi and Hot Weather demands are curtailed to Zero ,then all the complex satisfy the remaining requirements.

Statement - 7

Statement showing the Water Planning in Upper Godavari (upto Paithan dam) Sub basin considering 90 % dependable year of Jayakwadi project.

(Figures in Mcum)

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2003	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Mandhol	Ungated	3.61	2.52	8.78	8.78	0.98	0.00	3.45	2.37	0.00	6.80	1.43	8.23	13.15		
2	Mula - Spills	Gated	443.49	127.42	608.81	322.67	76.22	12.07	134.75	128.19	0.00	351.23	70.57	421.81	704.63		
	Total for complex		**447.10**	**129.94**	**617.59**	**331.45**	**77.20**	**12.07**	**138.20**	**130.56**	**0.00**	**358.04**	**72.00**	**430.04**	**717.78**	**17.06**	**17.06**
3	Bhandardara	Gated		8.50	304.10	161.17	34.66	18.74	94.24	44.74	0.00	192.38	16.66	209.03	434.64		
4	Nilwande	Gated		7.25	228.75	121.24	10.52	0.00	102.53	63.32	0.00	176.36	12.71	189.08	351.77		
5	Adhala	Ungated		2.42	27.61	27.61	2.66	0.00	10.55	4.30	0.00	17.51	3.12	20.63	38.73		
6	Bhojapur	Ungated		3.03	10.31	10.31	1.83	0.00	0.77	2.68	0.00	5.28	1.36	6.64	10.70		
7	Ozer Weir- spills	Ungated	491.41														
	Total for complex		**491.41**	**21.20**	**570.77**	**320.33**	**49.67**	**18.74**	**208.09**	**115.04**	**0.00**	**391.53**	**33.85**	**425.38**	**835.84**	**66.03**	**66.03**
8	Gautami	Gated		0.32	52.93	28.05	16.65	0.00	11.12	9.73	0.00	37.50	3.29	40.79	54.68		
9	Kashypi	Gated		0.95	51.75	27.43	0.00	0.00	6.14	2.51	0.00	8.65	2.34	10.99	55.31		
10	Gangapur	Gated	347.24	12.00	203.88	108.06	88.32	44.45	0.00	24.88	0.00	157.65	29.32	186.98	214.82		
	Total for complex		**347.24**	**13.27**	**308.56**	**163.54**	**104.97**	**44.45**	**17.26**	**37.12**	**0.00**	**203.80**	**34.96**	**238.76**	**324.81**	**108.48**	**108.48**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2003	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11	Alandi	Ungated		2.06	27.47	27.47	0.00	0.05	7.93	8.93	0.00	16.91	5.27	22.17	40.67		
12	Kadwa	Gated		6.68	52.90	28.04	14.40	0.00	24.43	11.40	0.00	50.23	10.30	60.53	80.70		
13	Bham	Ungated		5.66	69.76	69.76	0.00	0.00	0.00	0.00	0.00	0.00	8.78	8.78	8.78		
14	Bhawali	Ungated		3.96	40.79	40.79	0.00	0.00	3.09	2.22	0.00	5.30	5.32	10.62	18.64		
15	Waki	Gated		5.23	70.57	37.40	0.00	0.00	0.00	0.00	0.00	0.00	6.91	6.91	12.85		
16	Darna	Gated		7.05	219.82	116.50	43.44	5.70	4.54	4.68	0.00	58.36	35.06	93.42	47.89		
17	Mukane	Gated		9.18	204.98	108.64	15.74	2.07	0.52	0.37	0.00	18.71	25.36	44.07	102.46		
18	Waldevi	Ungated		1.92	32.09	32.09	0.10	9.74	5.58	4.84	0.00	20.25	4.62	24.87	20.76		
19	N.M Express canal						0.00	0.00	103.25	74.06	0.00	177.30		177.30	445.05		
20	Godavari canals						0.00	0.00	76.48	78.84	0.00	155.32		155.32	442.24		
21	NM Weir - spills		1323.20														
	Total for complex		**1323.20**	**41.74**	**718.38**	**460.69**	**73.68**	**17.57**	**225.81**	**185.34**	**0.00**	**502.39**	**101.61**	**604.00**	**1220.04**	**719.20**	**719.20**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2003	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22	Karanjwan	Gated	156.85	9.34	166.22	88.10	0.00	0.88	2.25	1.64	0.00	4.77	7.76	12.53	24.92		
23	Waghad	Ungated	82.09	4.25	72.23	72.23	0.00	0.00	9.85	8.61	0.00	18.46	3.23	21.69	46.29		
24	Punegaon	Gated	15.91	2.81	17.57	9.31	0.00	0.00	2.81	5.23	0.00	8.04	1.01	9.04	0.00		
25	Ojharkhed	Ungated	49.24	7.64	60.32	60.32	2.55	0.20	15.54	13.34	0.00	31.62	3.78	35.40	105.29		
26	Palkhed	Gated	69.54	1.77	21.24	11.26	19.05	3.96	63.70	53.49	0.00	140.19	3.70	143.89	279.18		
27	Tisgaon	Ungated	11.27	2.70	12.76	12.76	0.74	0.00	2.75	1.96	0.00	5.45	1.46	6.91	0.84		
28	Spills		-20.55														
	Total for complex		**364.35**	**28.51**	**350.34**	**253.98**	**22.34**	**5.04**	**96.89**	**84.26**	**0.00**	**208.52**	**20.94**	**229.46**	**456.52**	**134.89**	**110.37**
29	Paithan	Gated	**528.79**	**738.10**	**2170.94**	**0.00**	**226.62**	**128.59**	**427.72**	**334.16**	**0.00**	**1117.08**	**437.54**	**1554.62**	**2618.59**	**-4.69**	**-1021.14**
	Grand Total		**3502.09**	**972.76**	**4736.58**	**1529.99**	**554.47**	**226.46**	**1113.96**	**886.48**	**0.00**	**2781.36**	**700.91**	**3482.27**	**6173.58**		

Notes :

1) Mandatory live storage is as per statement no 1,considering the spillway release restrictions
2) Yield is calculated after deducting spills from observed yield for Mula (0 Mcum), Ozar weir (122.04 Mcum), N M Weir(1056.06 Mcum), and Palkhed (20.55 Mcum)
3) Non Irrigation water demands are considered at 80% ,as sanctioned demands account for future demands.
4) Irrigation demands are considered at 80 % of design use taking into account the efficient use of water .
5) For 90% dependable year, if Hot Weather demands are curtailed to zero, and Rabi demands reduced by 60% further(i.e. Demands= 32%), and use of carryover of Paithan dam to the extent of 4.69 Mcum out of 381.70 Mcum, then all the complex satisfy the remaining requirements.

Statement - 8

Statement showing the Water Planning in Upper Godavari (upto Paithan dam) Sub basin considering 75% dependable year of Jayakwadi Project

(Figures in Mcum)

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 1992	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Mandhol	Ungated	55.88	2.52	8.78	8.78	0.98	0.00	3.45	3.85	0.00	8.29	1.43	9.72	13.15		
2	Mula - Spills	Gated	368.94	127.42	608.81	322.67	76.22	12.07	134.75	208.31	0.00	431.35	76.21	507.56	704.63		
	Total for complex		**424.82**	**129.94**	**617.59**	**331.45**	**77.20**	**12.07**	**138.20**	**212.17**	**0.00**	**439.64**	**77.64**	**517.28**	**717.78**	**-92.46**	**0.00**
3	Bhandardara	Gated		8.50	304.10	161.17	34.66	18.74	94.24	72.70	0.00	220.34	18.65	238.99	434.64		
4	Nilwande	Gated		7.25	228.75	121.24	10.52	0.00	102.53	102.89	0.00	215.94	13.87	229.81	351.77		
5	Adhala	Ungated		2.42	27.61	27.61	2.66	0.00	10.55	6.99	0.00	20.20	3.12	23.32	38.73		
6	Bhojapur	Ungated		3.03	10.31	10.31	1.83	0.00	0.77	4.36	0.00	6.96	1.36	8.32	10.70		
7	Ozer Weir- spills	Ungated	462.55														
	Total for complex		**462.55**	**21.20**	**570.77**	**320.33**	**49.67**	**18.74**	**208.09**	**186.93**	**0.00**	**463.43**	**37.01**	**500.44**	**835.84**	**-37.89**	**0.00**
8	Gautami	Gated		0.32	52.93	28.05	16.65	0.00	11.12	15.81	0.00	43.58	3.48	47.06	54.68		
9	Kashypi	Gated		0.95	51.75	27.43	0.00	0.00	6.14	4.08	0.00	10.22	2.53	12.75	55.31		
10	Gangapur	Gated	243.07	12.00	203.88	108.06	88.32	44.45	0.00	40.44	0.00	173.20	30.60	203.80	214.82		
	Total for complex		**243.07**	**13.27**	**308.56**	**163.54**	**104.97**	**44.45**	**17.26**	**60.33**	**0.00**	**227.00**	**36.61**	**263.61**	**324.81**	**-20.54**	**0.00**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 1992	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11	Alandi	Ungated		2.06	27.47	27.47	0.00	0.05	7.93	14.51	0.00	22.49	6.24	28.73	40.67		
12	Kadwa	Gated		6.68	52.90	28.04	14.40	0.00	24.43	18.52	0.00	57.35	11.09	68.44	80.70		
13	Bham	Ungated		5.66	69.76	69.76	0.00	0.00	0.00	0.00	0.00	0.00	8.78	8.78	8.78		
14	Bhawali	Ungated		3.96	40.79	40.79	0.00	0.00	3.09	3.60	0.00	6.69	5.32	12.01	18.64		
15	Waki	Gated		5.23	70.57	37.40	0.00	0.00	0.00	0.00	0.00	0.00	9.09	9.09	12.85		
16	Darna	Gated		7.05	219.82	116.50	43.44	5.70	4.54	7.60	0.00	61.28	41.69	102.97	47.89		
17	Mukane	Gated		9.18	204.98	108.64	15.74	2.07	0.52	0.60	0.00	18.94	30.60	49.54	102.46		
18	Waldevi	Ungated		1.92	32.09	32.09	0.10	9.74	5.58	7.86	0.00	23.27	5.22	28.49	20.76		
19	N.M Express canal						0.00	0.00	103.25	120.34	0.00	223.59		223.59	445.05		
20	Godavari canals						0.00	0.00	76.48	128.12	0.00	204.60		204.60	442.24		
21	NM Weir - Spills		650.16														
	Total for complex		**650.16**	**41.74**	**718.38**	**460.69**	**73.68**	**17.57**	**225.81**	**301.17**	**0.00**	**618.22**	**118.04**	**736.26**	**1220.04**	**-86.10**	**0.00**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 1992	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22	Karanjwan	Gated	128.47	9.34	166.22	88.10	0.00	0.88	2.25	2.66	0.00	5.79	9.72	15.51	24.92		
23	Waghad	Ungated	101.26	4.25	72.23	72.23	0.00	0.00	9.85	13.99	0.00	23.84	4.05	27.89	46.29		
24	Punegaon	Gated	0.00	2.81	17.57	9.31	0.00	0.00	2.81	8.50	0.00	11.30	1.26	12.56	0.00		
25	Ojharkhed	Ungated	76.82	7.64	60.32	60.32	2.55	0.20	15.54	21.67	0.00	39.96	4.73	44.69	105.29		
26	Palkhed	Gated	207.86	1.77	21.24	11.26	19.05	3.96	63.70	86.92	0.00	173.62	4.63	178.25	279.18		
27	Tisgaon	Ungated	0.00	2.70	12.76	12.76	0.74	0.00	2.75	3.18	0.00	6.67	1.83	8.50	0.84		
28	Spills		-105.81														
	Total for complex		**408.60**	**28.51**	**350.34**	**253.98**	**22.34**	**5.04**	**96.89**	**136.92**	**0.00**	**261.19**	**26.23**	**287.41**	**456.52**	**121.19**	**121.19**
29	**Paithan**	**Gated**	**816.53**	**738.10**	**2170.94**	**0.00**	**226.62**	**128.59**	**427.72**	**543.00**	**0.00**	**1325.93**	**464.50**	**1790.43**	**2618.59**	**-852.71**	**-121.19**
	Grand Total		**3005.73**	**972.76**	**4736.58**	**1529.99**	**554.47**	**226.46**	**1113.96**	**1440.52**	**0.00**	**3335.41**	**760.02**	**4095.43**	**6173.58**		

Notes :

1) Mandatory live storage is as per statement no 1,considering the spillway release restrictions
2) Yield is calculated after deducting spills from observed yield for Mula (0 Mcum), Ozar weir (52.59 Mcum), N M Weir(37.58 Mcum) and Palkhed (105.81 Mcum)
3) Non irrigation water demands are considered at 80%, as sanctioned demands account for future demands.
4) Irrigation demands are considered at 80% of design use taking into account the efficient use of water
5) For 75% dependable year, Hot Weather demands are curtailed to zero and Rabi demands reduced by 35% further (i.e. demands = 52%). All the complex except Palkhed fail to satisfy the remaining requirements. In case of Mula, Gangapur and Paithan dams, the short fall can be met with from carry over to some extent.

Statement - 9

Statement showing the Water Planning in Upper Godavari (upto Paithan dam) Sub basin considering 50% dependable year of Jayakwadi project.

(Figures in Mcum)

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 1999	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Mandhol	Ungated	10.29	2.52	8.78	8.78	0.98	0.00	3.45	5.34	0.00	9.77	1.43	11.20	13.15		
2	Mula - Spills	Gated	666.65	127.42	608.81	322.67	76.22	12.07	134.75	288.43	0.00	511.47	81.89	593.36	704.63		
	Total for complex		**676.94**	**129.94**	**617.59**	**331.45**	**77.20**	**12.07**	**138.20**	**293.77**	**0.00**	**521.24**	**83.32**	**604.56**	**717.78**	**72.39**	**72.39**
3	Bhandardara	Gated		8.50	304.10	161.17	34.66	18.74	94.24	100.66	0.00	248.30	20.35	268.64	434.64		
4	Nilwande	Gated		7.25	228.75	121.24	10.52	0.00	102.53	142.46	0.00	255.51	14.80	270.31	351.77		
5	Adhala	Ungated		2.42	27.61	27.61	2.66	0.00	10.55	9.68	0.00	22.89	3.12	26.01	38.73		
6	Bhojapur	Ungated		3.03	10.31	10.31	1.83	0.00	0.77	6.03	0.00	8.63	1.36	9.99	10.70		
7	Ozer Weir- spills	Ungated	574.96														
	Total for complex		**574.96**	**21.20**	**570.77**	**320.33**	**49.67**	**18.74**	**208.09**	**258.83**	**0.00**	**535.33**	**39.63**	**574.96**	**835.84**	**0.00**	**0.00**
8	Gautami	Gated		0.32	52.93	28.05	16.65	0.00	11.12	21.89	0.00	49.66	3.74	53.39	54.68		
9	Kashypi	Gated		0.95	51.75	27.43	0.00	0.00	6.14	5.65	0.00	11.79	2.71	14.50	55.31		
10	Gangapur	Gated	278.74	12.00	203.88	108.06	88.32	44.45	0.00	55.99	0.00	188.76	31.78	220.54	214.82		
	Total for complex		**278.74**	**13.27**	**308.56**	**163.54**	**104.97**	**44.45**	**17.26**	**83.53**	**0.00**	**250.20**	**38.23**	**288.43**	**324.81**	**-9.69**	**0.00**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 1999	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11	Alandi	Ungated		2.06	27.47	27.47	0.00	0.05	7.93	20.10	0.00	28.07	7.24	35.31	40.67		
12	Kadwa	Gated		6.68	52.90	28.04	14.40	0.00	24.43	25.65	0.00	64.48	11.86	76.33	80.70		
13	Bham	Ungated		5.66	69.76	69.76	0.00	0.00	0.00	0.00	0.00	0.00	8.78	8.78	8.78		
14	Bhawali	Ungated		3.96	40.79	40.79	0.00	0.00	3.09	4.99	0.00	8.08	5.32	13.40	18.64		
15	Waki	Gated		5.23	70.57	37.40	0.00	0.00	0.00	0.00	0.00	0.00	10.63	10.63	12.85		
16	Darna	Gated		7.05	219.82	116.50	43.44	5.70	4.54	10.53	0.00	64.21	49.16	113.37	47.89		
17	Mukane	Gated		9.18	204.98	108.64	15.74	2.07	0.52	0.84	0.00	19.17	37.33	56.50	102.46		
18	Waldevi	Ungated		1.92	32.09	32.09	0.10	9.74	5.58	10.88	0.00	26.30	5.89	32.19	20.76		
19	N.M Express canal						0.00	0.00	103.25	166.63	0.00	269.88		269.88	445.05		
20	Godavari canals						0.00	0.00	76.48	177.40	0.00	253.88		253.88	442.24		
21	NM Weir - spills		1025.99														
	Total for complex		**1025.99**	**41.74**	**718.38**	**460.69**	**73.68**	**17.57**	**225.81**	**417.00**	**0.00**	**734.06**	**136.20**	**870.26**	**1220.04**	**155.73**	**155.73**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 1999	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22	Karanjwan	Gated	166.22	9.34	166.22	88.10	0.00	0.88	2.25	3.69	0.00	6.81	11.68	18.49	24.92		
23	Waghad	Ungated	83.76	4.25	72.23	72.23	0.00	0.00	9.85	19.37	0.00	29.22	4.87	34.09	46.29		
24	Punegaon	Gated	7.87	2.81	17.57	9.31	0.00	0.00	2.81	11.76	0.00	14.57	1.51	16.08	0.00		
25	Ojharkhed	Ungated	62.32	7.64	60.32	60.32	2.55	0.20	15.54	30.01	0.00	48.30	5.69	53.99	105.29		
26	Palkhed	Gated	22.51	1.77	21.24	11.26	19.05	3.96	63.70	120.35	0.00	207.05	5.57	212.62	279.18		
27	Tisgaon	Ungated	6.80	2.70	12.76	12.76	0.74	0.00	2.75	4.41	0.00	7.89	2.20	10.09	0.84		
28	Spliis																
	Total for complex		**349.48**	**28.51**	**350.34**	**253.98**	**22.34**	**5.04**	**96.89**	**189.58**	**0.00**	**313.85**	**31.51**	**345.36**	**456.52**	**4.12**	**4.12**
29	Paithan	Gated	**1971.30**	**738.10**	**2170.94**	**0.00**	**226.62**	**128.59**	**427.72**	**751.85**	**0.00**	**1534.78**	**492.34**	**2027.12**	**2618.59**	**176.43**	**-232.25**
	Grand Total		**4877.41**	**972.76**	**4736.58**	**1529.99**	**554.47**	**226.46**	**1113.96**	**1994.56**	**0.00**	**3889.45**	**821.23**	**4710.68**	**6173.58**		

Notes:

1) Mandatory live storage is as per statement no 1,considering the spillway release restrictions
2) Yield is calculated after deducting spills from observed yield for Mula (29.16 Mcum), Ozar weir (76.04 Mcum), N M Weir(121.51 Mcum) and Palkhed (0 Mcum)
3) Non Irrigation water demands are considered at 80% ,as sanctioned demands account for future demands.
4) Irrigation demands are considered at 80 % of design use taking into account the efficient use of water
5) For 50% dependable year, if Hot Weather demands are curtailed to Zero and Rabi demands are reduced by 10% further (i.e. Demands = 72%), and use of carry over of Gangapur dam to the extent of 9.69 Mcum out of 11.64 Mcum, then all the complex satisfy the remaining requirements.

Statement - 10

Statement showing the Water Planning in Upper Godavari (upto Paithan dam) Sub Basin considering Average yield.

(Figures in Mcum)

Sr no.	Name of Dam and complex	Gated/ Ungated	Average yield	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Mandhol	Ungated	16.67	2.52	8.78	8.78	0.98	0.00	3.45	5.93	0.00	10.36	1.43	11.79	13.15		
2	Mula - Spills	Gated	801.33	127.42	608.81	322.67	76.22	12.07	134.75	320.48	0.00	543.52	84.08	627.60	704.63		
	Total for complex		**818.00**	**129.94**	**617.59**	**331.45**	**77.20**	**12.07**	**138.20**	**326.41**	**0.00**	**553.88**	**85.51**	**639.39**	**717.78**	**178.61**	**178.61**
3	Bhandardara	Gated		8.50	304.10	161.17	34.66	18.74	94.24	111.84	0.00	259.48	21.42	280.90	434.64		
4	Nilwande	Gated		7.25	228.75	121.24	10.52	0.00	102.53	158.29	0.00	271.34	15.17	286.51	351.77		
5	Adhala	Ungated		2.42	27.61	27.61	2.66	0.00	10.55	10.76	0.00	23.97	3.12	27.09	38.73		
6	Bhojapur	Ungated		3.03	10.31	10.31	1.83	0.00	0.77	6.70	0.00	9.30	1.36	10.66	10.70		
7	Ozer Weir- spills	Ungated	701.68														
	Total for complex		**701.68**	**21.20**	**570.77**	**320.33**	**49.67**	**18.74**	**208.09**	**287.59**	**0.00**	**564.09**	**41.07**	**605.16**	**835.84**	**96.52**	**96.52**
8	Gautami	Gated		0.32	52.93	28.05	16.65	0.00	11.12	24.32	0.00	52.09	3.87	55.96	54.68		
9	Kashypi	Gated		0.95	51.75	27.43	0.00	0.00	6.14	6.28	0.00	12.42	2.81	15.22	55.31		
10	Gangapur	Gated	350.66	12.00	203.88	108.06	88.32	44.45	0.00	62.21	0.00	194.98	31.99	226.97	214.82		
	Total for complex		**350.66**	**13.27**	**308.56**	**163.54**	**104.97**	**44.45**	**17.26**	**92.81**	**0.00**	**259.48**	**38.67**	**298.15**	**324.81**	**52.51**	**52.51**

Sr no.	Name of Dam and complex	Gated/ Ungated	Average yield	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11	Alandi	Ungated		2.06	27.47	27.47	0.00	0.05	7.93	22.33	0.00	30.30	7.54	37.84	40.67		
12	Kadwa	Gated		6.68	52.90	28.04	14.40	0.00	24.43	28.50	0.00	67.32	12.09	79.41	80.70		
13	Bham	Ungated		5.66	69.76	69.76	0.00	0.00	0.00	0.00	0.00	0.00	8.78	8.78	8.78		
14	Bhawali	Ungated		3.96	40.79	40.79	0.00	0.00	3.09	5.54	0.00	8.63	5.32	13.95	18.64		
15	Waki	Gated		5.23	70.57	37.40	0.00	0.00	0.00	0.00	0.00	0.00	10.63	10.63	12.85		
16	Darna	Gated		7.05	219.82	116.50	43.44	5.70	4.54	11.70	0.00	65.38	49.37	114.75	47.89		
17	Mukane	Gated		9.18	204.98	108.64	15.74	2.07	0.52	0.93	0.00	19.26	37.35	56.62	102.46		
18	Waldevi	Ungated		1.92	32.09	32.09	0.10	9.74	5.58	12.09	0.00	27.50	6.06	33.56	20.76		
19	N.M Express canal						0.00	0.00	103.25	185.14	0.00	288.39		288.39	445.05		
20	Godavari canals						0.00	0.00	76.48	197.11	0.00	273.59		273.59	442.24		
21	NM Weir - Spill		1385.74														
	Total for complex		**1385.74**	**41.74**	**718.38**	**460.69**	**73.68**	**17.57**	**225.81**	**463.34**	**0.00**	**780.39**	**137.13**	**917.52**	**1220.04**	**468.22**	**468.22**

Sr no.	Name of Dam and complex	Gated/ Ungated	Average yield	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22	Karanjwan	Gated	175.49	9.34	166.22	88.10	0.00	0.88	2.25	4.10	0.00	7.22	12.46	19.68	24.92		
23	Waghad	Ungated	95.52	4.25	72.23	72.23	0.00	0.00	9.85	21.52	0.00	31.37	5.19	36.56	46.29		
24	Punegaon	Gated	20.97	2.81	17.57	9.31	0.00	0.00	2.81	13.07	0.00	15.88	1.61	17.49	0.00		
25	Ojharkhed	Ungated	67.88	7.64	60.32	60.32	2.55	0.20	15.54	33.34	0.00	51.63	6.07	57.70	105.29		
26	Palkhed	Gated	167.80	1.77	21.24	11.26	19.05	3.96	63.70	133.72	0.00	220.42	5.94	226.36	279.18		
27	Tisgaon	Ungated	16.22	2.70	12.76	12.76	0.74	0.00	2.75	4.90	0.00	8.38	2.35	10.73	0.84		
28	spills																
	Total for complex		**543.88**	**28.51**	**350.34**	**253.98**	**22.34**	**5.04**	**96.89**	**210.65**	**0.00**	**334.91**	**33.63**	**368.54**	**456.52**	**175.34**	**175.34**
29	Paithan	Gated	**1145.00**	**738.10**	**2170.94**	**0.00**	**226.62**	**128.59**	**427.72**	**835.39**	**0.00**	**1618.32**	**501.62**	**2119.94**	**2618.59**	**-3.74**	**-971.20**
	Grand Total		**4944.96**	**972.76**	**4736.58**	**1529.99**	**554.47**	**226.46**	**1113.96**	**2216.18**	**0.00**	**4111.07**	**837.63**	**4948.70**	**6173.58**		

Notes:

1) Mandatory live storage is as per statement no 1,considering the spillway release restrictions
2) For average yield scenario , the yield including spills are used by complex itself. So, the Spills observed are deducted from Paithan average yield.
3) Non Irrigation water demands are considered at 80% ,as sanctioned demands account for future demands.
4) Irrigation demands are considered at 80 % of design use taking into account the efficient use of water
5) For Average Yield Scenario, if Hot Weather demands are curtailed to Zero, and use of carryover of Paithan dam to the extent of 3.74 Mcum out of 381.70 Mcum, then all the complex satisfy the remaining requirements.

Statement -11

Statement showing the Water Planning in Upper Godavari (upto Paithan dam) Sub basin considering yield observed in the good year (i.e. year 2008)

(Figures in Mcum)

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2008	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Mandhol	Ungated	18.30	2.52	8.78	8.78	1.23	0.00	4.31	7.41	0.00	12.95	1.43	14.38	13.15		
2	Mula - Spills	Gated	739.63	127.42	608.81	322.67	95.27	15.09	168.44	400.60	0.00	679.40	93.03	772.43	704.63		
	Total for complex		**757.93**	**129.94**	**617.59**	**331.45**	**96.50**	**15.09**	**172.75**	**408.01**	**0.00**	**692.35**	**94.46**	**786.81**	**717.78**	**40.15**	**40.15**
3	Bhandardara	Gated		8.50	304.10	161.17	43.33	23.42	117.8	139.80	164.30	488.65	33.11	521.76	434.64		
4	Nilwande	Gated		7.25	228.75	121.24	13.15	0.00	128.16	197.86	0.00	339.17	16.63	355.80	351.77		
5	Adhala	Ungated		2.42	27.61	27.61	3.32	0.00	13.19	13.45	8.97	38.93	3.12	42.05	38.73		
6	Bhojapur	Ungated		3.03	10.31	10.31	2.29	0.00	0.96	8.38	0.00	11.63	1.36	12.99	10.70		
7	Ozer Weir	Ungated	796.66														
	Total for complex		**796.66**	**21.20**	**570.77**	**320.33**	**62.09**	**23.42**	**260.11**	**359.49**	**173.27**	**878.38**	**54.22**	**932.60**	**835.84**	**-39.18**	**0.00**
8	Gautami	Gated		0.32	52.93	28.05	20.81	0.00	13.90	30.40	8.60	73.71	4.76	78.47	54.68		
9	Kashypi	Gated		0.95	51.75	27.43	0.00	0.00	7.67	7.85	3.20	18.72	3.36	22.08	55.31		
10	Gangapur	Gated	324.81	12.00	203.88	108.06	110.40	55.560	0.00	77.76	71.21	314.93	48.02	362.95	214.82		
	Total for complex		**324.81**	**13.27**	**308.56**	**163.54**	**131.21**	**55.56**	**21.57**	**116.01**	**83.01**	**407.36**	**56.14**	**463.50**	**324.81**	**0.00**	0.00

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2008	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11	Alandi	Ungated		2.06	27.47	27.47	0.00	0.06	9.91	27.91	0.00	37.88	8.56	46.44	40.67		
12	Kadwa	Gated		6.68	52.90	28.04	18.00	0.00	30.54	35.62	3.67	87.83	14.01	101.84	80.70		
13	Bham	Ungated		5.66	69.76	69.76	0.00	0.00	0.00	0.00	0.00	0.00	8.78	8.78	8.78		
14	Bhawali	Ungated		3.96	40.79	40.79	0.00	0.00	3.86	6.93	2.53	13.32	5.32	18.64	18.64		
15	Waki	Gated		5.23	70.57	37.40	0.00	0.00	0.00	0.00	0.00	0.00	11.23	11.23	12.85		
16	Darna	Gated		7.05	219.82	116.50	54.30	7.13	5.67	14.62	5.95	87.67	54.98	142.65	47.89		
17	Mukane	Gated		9.18	204.98	108.64	19.68	2.59	0.65	1.16	0.43	24.51	41.92	66.43	102.46		
18	Waldevi	Ungated		1.92	32.09	32.09	0.12	12.18	6.97	15.11	2.64	37.02	7.20	44.22	20.76		
19	N.M Express canal								129.06	231.43	84.56	445.05	0.00	445.05	445.05		
20	Godavari canals								95.60	246.39	100.25	442.24	0.00	442.24	442.24		
21	NMWEIR -Spills		1271.92														
	Total for complex		**1271.92**	**41.74**	**718.38**	**460.69**	**92.10**	**21.96**	**282.26**	**579.17**	**200.03**	**1175.52**	**152.01**	**1327.53**	**1220.04**	**51.88**	**51.88**

Sr no.	Name of Dam and complex	Gated/ Ungated	Yield in year 2008	Dead Storage	Design Live Storage	Mandatory Live storage	Domestic Use	Industrial Use	Kharif Use	Rabi Use	H.W. Use	Total Use exclud. Evapo.	Evaporation.	Total Use includ. Evapo.	Total Use restricted to design use including Evapo.	Balance yield after fulfilling Total Use	Balance water for Paithan Dam
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22	Karanjwan	Gated	215.97	9.34	166.22	88.10	0.00	1.10	2.81	5.12	0.00	9.03	16.99	26.02	24.92		
23	Waghad	Ungated	102.45	4.25	72.23	72.23	0.00	0.00	12.31	26.90	0.00	39.21	7.08	46.29	46.29		
24	Punegaon	Gated	67.14	2.81	17.57	9.31	0.00	0.00	3.51	16.34	0.00	19.85	2.24	22.09	0.00		
25	Ojharkhed	Ungated	112.98	7.64	60.32	60.32	3.19	0.25	19.42	41.68	0.00	64.54	8.27	72.81	105.29		
26	Palkhed	Gated	261.47	1.77	21.24	11.26	23.81	4.95	79.62	167.15	4.93	280.46	8.10	288.56	279.18		
27	Tisgaon	Ungated	19.75	2.70	12.76	12.76	0.92	0.00	3.44	6.12	0.00	10.48	3.20	13.68	0.84		
28	Spills		-170.34														
	Total for complex		**609.42**	**28.51**	**350.34**	**253.98**	**27.92**	**6.30**	**121.11**	**263.31**	**4.93**	**423.57**	**45.88**	**469.45**	**456.52**	**152.90**	**152.90**
29	Paithan	Gated	**2709.23**	**738.10**	**2170.94**	**0.00**	**283.27**	**160.74**	**534.65**	**1044.24**	**374.99**	**2397.89**	**594.04**	**2991.93**	**2618.59**	**335.57**	**-244.93**
	Grand Total		**6469.97**	**972.76**	**4736.58**	**1529.99**	**693.09**	**283.07**	**1392.45**	**2770.23**	**836.23**	**5975.07**	**996.76**	**6971.82**	**6173.58**		

Notes:

1) Mandatory live storage is as per statement no 1,considering the spillway release restrictions
2) Yield is calculated after deducting spills from observed yield for Mula (197.54 Mcum), Gangapur (153.10 Mcum), NM Weir (1863.88 Mcum) and Palkhed (170.34 Mcum)
3) Spills of Ozer Weir are not deducted from Ozer as it will be obstructed by Nilwande after its completion. The same spills are deducted from Paithan as it will not reach after completion of Nilwande.
4) For the good year (i.e. year 2008), all the complex (except marginal failure in Pravara complex) satisfy the design use requirements.

गोदावरी खोऱ्यातील जलाशयांचे एकात्मिक प्रवर्तनासाठी विनियमन तयार करण्यासाठी अभ्यास गटाची नियुक्ती करणेबाबत.

महाराष्ट्र शासन

जलसंपदा विभाग

शासन निर्णय क्रमांकः संकीर्ण २०१२/(८९१/१२)/२०१२/सिंव्य (धोरण)

मंत्रालय, मुंबई ४०० ०३२

तारीख: : ०७ मार्च, २०१३.

वाचा

१) **शासन निर्णय क्रमांकः संकीर्ण २०१२/(८९१/१२)२०१२/सिंव्य (धोरण), दि. २९ जानेवारी, २०१३**

शासन निर्णय

जायकवाडी धरणाच्या उर्ध्व बाजुकडील धरणात साठणाऱ्या पाण्याचा योग्य प्रकारे वाटप होण्याच्या दृष्टीने खरीप हंगामातील पाण्याची निकड बाष्पीभवन, तसेच वहनव्यय इ. विचारात घेऊन मार्गदर्शक तत्वे तयार करण्याच्या दृष्टीने शासन स्तरावर वरील संदर्भान्वये अभ्यासगट गठीत करण्यात आलेला आहे.

सदर अभ्यास गटामध्ये **विशेष निमंत्रित** म्हणून खालील सदस्याचा नव्याने समावेश करण्यात येत आहे.

१) श्री. आ. भ. पाटील , कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद.

वर नमूद नव्याने समाविष्ट विशेष निमंत्रित सदस्य उपरोक्त अभ्यास गटाच्या कार्यकक्षेमध्ये समाविष्ट विषयाशी संबंधित उपलब्ध माहिती व अभ्यासानुसार समितीला मार्गदर्शन करतील. तसेच अभ्यास गटाला अंतिम अहवाल सादर करण्यास सहाय्य करतील.

सदर शासन निर्णय महाराष्ट्र शासनाच्या www.maharashtra.gov.in या संकेतस्थळावर उपलब्ध करण्यात आला असून त्याचा संकेताक २०१३०३०७१२२५०९४५२७ असा आहे. हा आदेश डिजीटल स्वाक्षरीने साक्षांकित करुन काढण्यात येत आहे.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने.

(प्र. गो. मांदाडे)

शासनाचे उप सचिव

प्रत,

१. सचिव, महाराष्ट्र जलसंपत्ती नियमन प्राधिकरण, मुंबई

२. प्रधान सचिव, जलसंपदा विभाग, मंत्रालय, मुंबई
३. प्रधान सचिव, लाक्षेवि, जलसंपदा विभाग, मंत्रालय, मुंबई
४. कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद
५. मुख्य अभियंता, जलसंपदा विभाग, औरंगाबाद,
६. मुख्य अभियंता व मुख्य प्रशासक, लाक्षेविप्रा, औरंगाबाद
७. मुख्य अभियंता, जलसंपदा विभाग, उत्तर महाराष्ट्र प्रदेश, नाशिक
८. मुख्य अभियंता, जलविज्ञान प्रकल्प, नाशिक
९. मुख्य अभियंता, जलसंपदा विभाग, पुणे
१०. मुख्य अभियंता,(पाटबंधारे) व सहसचिव, जलसंपदा विभाग, मंत्रालय, मुंबई ३२
११. मुख्य अभियंता,(जलसंपत्ती) व सहसचिव, जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१२. उपसचिव (सिंव्य) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१३. उपसचिव (जलसंपत्ती) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१४. अधिक्षक अभियंता व प्रशासक, लाक्षेविप्रा, नाशिक
१५. अधिक्षक अभियंता, लाक्षेविप्रा, औरंगाबाद
१६. अवर सचिव (जलसंपत्ती / नियोजन) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१७. अवर सचिव (सिंव्य/धोरण) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१८. सिंव्य (धोरण) संग्रहार्थ.

गोदावरी खोऱ्यातील जलाशयांचे एकात्मिक प्रवर्तनासाठी विनियमन तयार करण्यासाठी अभ्यास गटाची नियुक्ती करणेबाबत.

महाराष्ट्र शासन
जलसंपदा विभाग
शासन निर्णय क्रमांकः संकीर्ण २०१२/(८९१/१२)/२०१२/सिंव्य (धोरण)

मंत्रालय, मुंबई ४०० ०३२
तारीख: २७ मे, २०१३.

वाचा

१) **शासन निर्णय क्रमांक :-** संकीर्ण २०१२/(८९१/१२)/२०१२/सिंव्य (धोरण) दि. २९ जानेवारी, २०१३ व दिनांक ७ मार्च, २०१३.

प्रस्तावना

उपरोक्त शासन निर्णयामधील अभ्यासगटाची कार्यकक्षा यामधील अनुक्रमांक ४ मध्ये सदरहू अभ्यास गटास ३१ मार्च,२०१३ पर्यंत आपला अहवाल सादर करण्याबाबत निर्देश दिले होते. सदरचा अहवालसादर करण्याकरिता समितीला खालील बाबीची पूर्तता करणे आवश्यक आहे.

१) अभ्यास गटासाठी आवश्यक संलग्न माहिती (डाटा) क्षेत्रिय अधिकाऱ्यांनी तयार करणे.
२) अभ्यास गटासाठी डाटाची पडताळणी (validation)गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद मार्फत करणे
३) गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद कडून प्राप्त डाटाचे पृथक्करण(analysis) अभ्यास गटामार्फत करणे.
४) गोदावरी उपखोऱ्यातील पैठण धरणाच्या संकल्पानाच्या गृहित धरलेले जलनियोजन व सद्यस्थितीत पाण्याची उपलब्धतता तसेच जलनियोजन यांचा तुलनात्मक अभ्यास करणे.
५) जायकवाडी जलाशयात पाणी टंचाई, परिस्थिती न उद्भवण्यासाठी गोदावरी उपखोऱ्यातील उर्वरित भागातील जलाशयाची एकात्मिक पध्दतीने प्रवर्तन करण्यासाठी विविध पर्यायांचा अभ्यास करणे.
६) अभ्यास गटाने विविध पर्यायाच्या अभ्यासावर आधारित योग्य ते विनियमन तयार करुन शासनास अहवाल सादर करणे.

उपरोक्त बाबी विचारात घेता, अभ्यास गटाची कामकाज करण्याच्या कालावधीत सुधारणा करण्याची बाब शासनाच्या विचाराधीन होती. त्यानुसार शासन आता खालील प्रमाणे निर्णय घेत आहे.

शासन निर्णय

अभ्यास गटाने आठवडानिहाय (Week-wise)वेळापत्रक तयार करावे, प्रत्येक आठवडयात अपेक्षित कार्यवाही व झालेली कार्यवाही (Outcome)त्यांच्यात अंतर्भूत करावी. या अटीच्या अधीन राहून संदर्भिय दि. २९.०१.२०१३ च्या शासन निर्णयातील अनुक्रमांक ४ मध्ये देण्यात आलेल्या कालावधीस

मुदतवाढ देण्यात येत आहे. आता समितीने आपले कामकाज दि. ३१ मे, २०१३ पूर्वी पुर्ण करुन शासनास अंतिम अहवाल सादर करावा.

सदर शासन निर्णय महाराष्ट्र शासनाच्या www.maharashtra.gov.in या संकेतस्थळावर उपलब्ध करण्यात आला असून त्याचा संकेताक २०१३०५२९११०३४२६८२७ असा आहे. हा आदेश डिजीटल स्वाक्षरीने साक्षांकित करुन काढण्यात येत आहे.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने.

प्र. गो. मांदाडे
शासनाचे उप सचिव

प्रत,

१. सचिव, महाराष्ट्र जलसंपत्ती नियमन प्राधिकरण, मुंबई
२. प्रधान सचिव, जलसंपदा विभाग, मंत्रालय, मुंबई
३. प्रधान सचिव, लाक्षेवि, जलसंपदा विभाग, मंत्रालय, मुंबई
४. कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद
५. मुख्य अभियंता, जलसंपदा विभाग, औरंगाबाद
६. मुख्य अभियंता व मुख्य प्रशासक, लाक्षेविप्रा, औरंगाबाद
७. मुख्य अभियंता, जलसंपदा विभाग, उत्तर महाराष्ट्र प्रदेश, नाशिक
८. मुख्य अभियंता, जलविज्ञान प्रकल्प, नाशिक
९. मुख्य अभियंता, जलसंपदा विभाग, पुणे
१०. मुख्य अभियंता,(पाटबंधारे) व सहसचिव, जलसंपदा विभाग, मंत्रालय, मुंबई ३२
११. मुख्य अभियंता,(जलसंपत्ती) व सहसचिव, जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१२. उपसचिव (सिंव्य) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१३. उपसचिव (जलसंपत्ती) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१४. अधिक्षक अभियंता व प्रशासक, लाक्षेविप्रा, नाशिक
१५. अधिक्षक अभियंता, लाक्षेविप्रा, औरंगाबाद
१६. अवर सचिव (जलसंपत्ती / नियोजन) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१७. अवर सचिव (सिंव्य/धोरण) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१८. सिंव्य (धोरण) संग्रहार्थ.

पृष्ठ २ पैकी २

गोदावरी खोऱ्यातील जलाशयांचे एकात्मिक प्रवर्तनासाठी विनियमन तयार करण्यासाठी अभ्यास गटाची नियुक्ती करणेबाबत.

महाराष्ट्र शासन
जलसंपदा विभाग
शासन निर्णय क्रमांकः संकीर्ण २०१२/(८९१/१२)/२०१२/सिंव्य (धोरण)

मंत्रालय, मुंबई ४०० ०३२
तारीख: : ३० जुलै, २०१३

वाचा –

१) शासन निर्णय क्रमांकः शासन निर्णय क्र. संकीर्ण २०१२/(८९१/१२)/२०१२/सिंव्य (धोरण) दि. २९ जानेवारी, २०१३ , दिनांक ७ मार्च, २०१३. व दि. २७ मे,२०१३

प्रस्तावना –

उपरोक्त शासन निर्णयामधील अभ्यासगटाची कार्यकक्षा यामधील अनुक्रमांक ४ मध्ये सदरहू अभ्यास गटास ३१ मार्च,२०१३ पर्यंत आपला अहवाल सादर करण्याबाबत निर्देश दिले होते. सदरचा अहवाल सादर करण्याकरिता समितीला खालील बाबीची पूर्तता करणे आवश्यक आहे.

१) अभ्यास गटासाठी आवश्यक संलग्न माहिती (डाटा) क्षेत्रिय अधिकाऱ्यांनी तयार करणे.

२) अभ्यास गटासाठी डाटाची पडताळणी (validation)गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद मार्फत करणे

३) गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद कडून प्राप्त डाटाचे पृथक्करण (analysis) अभ्यास गटामार्फत करणे.

४) गोदावरी उपखोऱ्यातील पैठण धरणाच्या संकल्पानाच्या गृहित धरलेले जलनियोजन व सद्यस्थितीत पाण्याची उपलब्धतता तसेच जलनियोजन यांचा तुलनात्मक अभ्यास करणे.

५) जायकवाडी जलाशयात पाणी टंचाई, परिस्थिती न उद्भवण्यासाठी गोदावरी उपखोऱ्यातील उर्वरित भागातील जलाशयाची एकात्मिक पध्दतीने प्रवर्तन करण्यासाठी विविध पर्यायांचा अभ्यास करणे.

६) अभ्यास गटाने विविध पर्यायाच्या अभ्यासावर आधारित योग्य ते विनियमन तयार करुन शासनास अहवाल सादर करणे.

उपरोक्त बाबी विचारात घेता, अभ्यास गटाची कामकाज करण्याच्या कालावधीत सुधारणा करण्याची बाब शासनाच्या विचाराधीन होती. त्यानुसार शासन आता खालील प्रमाणे निर्णय घेत आहे.

शासन निर्णय –

अभ्यास गटाने आठवडानिहाय (Week-wise)वेळापत्रक तयार करावे, प्रत्येक आठवडयात अपेक्षित कार्यवाही व झालेली कार्यवाही (Outcome)त्यांच्यात अंतर्भूत करावी. या अटीच्या अधीन राहून

संदर्भिय दि. २९.०१.२०१३ च्या शासन निर्णयातील अनुक्रमांक ४ मध्ये देण्यात आलेल्या कालावधीस मुदतवाढ देण्यात येत आहे. आता समितीने आपले कामकाज दि. ३१ जुलै, २०१३ पूर्वी पुर्ण करुन शासनास अंतिम अहवाल सादर करावा.

सदर शासन निर्णय महाराष्ट्र शासनाच्या www.maharashtra.gov.in या संकेतस्थळावर उपलब्ध करण्यात आला असून त्याचा संकेताक २०१३०७३०१५२३१७०३२७ असा आहे. हा आदेश डिजीटल स्वाक्षरीने साक्षांकित करुन काढण्यात येत आहे.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने.

(सं. अ. टाटू)
शासनाचे उप सचिव

प्रत,

१. सचिव, महाराष्ट्र जलसंपत्ती नियमन प्राधिकरण, मुंबई
२. प्रधान सचिव, जलसंपदा विभाग, मंत्रालय, मुंबई
३. प्रधान सचिव, लाक्षेवि, जलसंपदा विभाग, मंत्रालय, मुंबई
४. कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद
५. मुख्य अभियंता, जलसंपदा विभाग, औरंगाबाद
६. मुख्य अभियंता व मुख्य प्रशासक, लाक्षेविप्रा, औरंगाबाद
७. मुख्य अभियंता, जलसंपदा विभाग, उत्तर महाराष्ट्र प्रदेश, नाशिक
८. मुख्य अभियंता, जलविज्ञान प्रकल्प, नाशिक
९. मुख्य अभियंता, जलसंपदा विभाग, पुणे
१०. मुख्य अभियंता,(पाटबंधारे) व सहसचिव, जलसंपदा विभाग, मंत्रालय, मुंबई ३२
११. मुख्य अभियंता,(जलसंपत्ती) व सहसचिव, जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१२. उपसचिव (सिंव्य) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१३. उपसचिव (जलसंपत्ती) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१४. अधिक्षक अभियंता व प्रशासक, लाक्षेविप्रा, नाशिक
१५. अधिक्षक अभियंता, लाक्षेविप्रा, औरंगाबाद
१६. अवर सचिव (जलसंपत्ती / नियोजन) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१७. अवर सचिव (सिंव्य/धोरण) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१८. सिंव्य (धोरण) संग्रहार्थ

पृष्ठ २ पैकी २

गोदावरी खोऱ्यातील जलाशयांचे एकात्मिक प्रवर्तनासाठी विनियमन तयार करण्यासाठी अभ्यास गटाची नियुक्ती करणेबाबत.

महाराष्ट्र शासन
जलसंपदा विभाग
शासन निर्णय क्रमांकः संकीर्ण २०१२/(८९१/१२)/२०१२/सिंव्य (धोरण)

मंत्रालय, मुंबई ४०० ०३२
तारीख: २९ जानेवारी, २०१३.

<u>प्रस्तावना</u>

या वर्षीच्या पावसाळ्यात (सन २०१२) पावसाच्या दुर्भिक्षामुळे जायकवाडी धरणात अत्यल्प पाणीसाठा झाल्याने जायकवाडी धरणाच्या उर्ध्व भागातील १) दारणा २) गंगापूर ३) निळवंडे-भंडारदरा ४) प्रवरा ५) मुळा या पाच उप खोऱ्यांतून पाणी सोडण्याबाबत मराठवाडा जनता विकास परिषद, औरंगाबाद यांनी मा. उच्च न्यायालय खंडपीठ, औरंगाबाद येथे जनहित याचिका क्र. १००/१२ दाखल केलेली आहे.

या याचिकेसंदर्भात शासनाने सादर केलेल्या प्रतिज्ञापत्रानुसार, तसेच दिनांक १९.१२.२०१२ रोजी झालेल्या सुनावणी दरम्यानच्या आदेशात राज्यातील काही भागामध्ये पाण्याचे दुर्भिक्ष असल्याची वस्तुस्थिती विचारात घेऊन सर्वसाधारणपणे समन्यायी पध्दतीने पाणी वाटप होण्याच्या दृष्टीकोणातून आवश्यक त्या उपाययोजना करण्याची निकड विषद केली. याबाबत राज्य शासनाने दिनांक १७.१२.२०१२ रोजी सादर केलेल्या प्रतिज्ञापत्रात महाराष्ट्र जलसंपत्ती नियमन प्राधिकरण अधिनियम २००५ मधील कलम १२ (६)(ग) मध्ये नमूद केल्यानुसार याचिका कर्त्यांनी मागणी केल्यानुसार, पाण्याचे समन्यायी वाटप करणे तांत्रिक दृष्ट्या व प्रत्यक्षरित्या कार्यवाही करणे शक्य होणार नाही असे नमूद केले आहे. तथापि, पावसाळ्याच्या कालावधीमध्ये खोरे, उप-खोरे निहाय धरणात साठणाऱ्या पाण्याचे संनियंत्रण व नियोजन करण्याची आवश्यकता असल्याचे नमूद केले आहे. जायकवाडी धरणाच्या उर्ध्व बाजुकडील धरणात साठणाऱ्या पाण्याचा योग्य प्रकारे वाटप होण्याच्या दृष्टीने खरीप हंगामातील पाण्याची निकड बाष्पीभवन, तसेच वहनव्यय इ. विचारात घेऊन मार्गदर्शक तत्वे तयार करण्याच्या दृष्टीने अभ्यासगट गठीत करण्याचे शासनाचे विचाराधीन होते. या अनुषंगाने शासनाने खालीलप्रमाणे निर्णय घेतला आहे.

<u>शासन निर्णय</u>

जायकवाडी धरणाच्या उर्ध्व बाजुकडील धरणात साठणाऱ्या पाण्याचा योग्य प्रकारे वाटप होण्याच्या दृष्टीने खरीप हंगामातील पाण्याची निकड बाष्पीभवन, तसेच वहनव्यय इ. विचारात घेऊन मार्गदर्शक तत्वे तयार करण्याच्या दृष्टीने शासन स्तरावर खालीलप्रमाणे अभ्यासगट गठीत करण्यात येत आहे.

१	श्री. हि. ता. मेंढेगिरी, महासंचालक, जल व भूमी व्यवस्थापन संस्था (वाल्मी), औरंगाबाद	अध्यक्ष

२	श्री. चं. आ. बिराजदार, मुख्य अभियंता(विनिर्दिष्ट प्रकल्प), जलसंपदा विभाग, पुणे	सदस्य
३	श्री. एच. के. गोसावी, मुख्य अभियंता, जलविज्ञान प्रकल्प, नाशिक	सदस्य
४	श्री. भा.चं. कुंजीर, मुख्य अभियंता, उत्तर महाराष्ट्र प्रदेश, जलसंपदा विभाग, नाशिक	सदस्य
५	श्री. ब.म. सुकरे, मुख्य अभियंता, जलसंपदा विभाग, लाभक्षेत्र विकास प्राधिकरण, औरंगाबाद	सदस्य
६	श्री. ए. पी. कोहिरकर, अधीक्षक अभियंता, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद	सदस्य सचिव

सदरहू अभ्यासगटाची कार्यकक्षा खालीलप्रमाणे राहील---

१) गोदावरी खोऱ्यातील जायकवाडी धरणाच्या उर्ध्व बाजुस खोरे/उप-खोऱ्यातील सर्व जलाशयाचे एकात्मिक पध्दतीने पावसाळयात धरणे भरतांना जायकवाडी प्रकल्पाचे जलाशयात टंचाई परिस्थिती न उदभवण्यासाठी प्रचलन करणे बाबतीत मार्गदर्शक विनिमय तयार करणे.

२) अशी यंत्रणा प्रभावीपणे राबविण्याच्या दृष्टीने कार्यपध्दती विकसीत करणे.

३) उपरोक्त विषयी तांत्रिक, आर्थिक व व्यवस्थापकीय बाबींसंदर्भात सुधारणा सूचविणे

४) सदरहू समिती आपला अहवाल ३१.३.२०१३ पर्यंत सादर करेल.

अभ्यास गटाच्या सदस्यांनी आपला कार्यरत पदाचा कार्यभार सांभाळून उपरोक्त कार्यवाही पार पाडावी. याबाबत सदस्यांना कोणत्याही प्रकारचे मानधन दिले जाणार नाही. अभ्यास गटाचे कामकाज संपल्यानंतर हा अभ्यास गट आपोआप संपुष्टात येईल.

सदर शासन निर्णय महाराष्ट्र शासनाच्या www.maharashtra.gov.in या संकेतस्थळावर उपलब्ध करण्यात आला असून त्याचा संकेताक २०१३०१२९१४५००२५३२७ असा आहे. हा आदेश डिजीटल स्वाक्षरीने साक्षांकित करुन काढण्यात येत आहे.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने.

(प्र. गो. मांदाडे)
शासनाचे उप सचिव

प्रत,

१. सचिव, महाराष्ट्र जलसंपत्ती नियमन प्राधिकरण, मुंबई

पृष्ठ ३ पैकी २

२. प्रधान सचिव, जलसंपदा विभाग, मंत्रालय, मुंबई
३. प्रधान सचिव, लाक्षेवि, जलसंपदा विभाग, मंत्रालय, मुंबई
४. कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद
५. मुख्य अभियंता, जलसंपदा विभाग, औरंगाबाद,
६. मुख्य अभियंता व मुख्य प्रशासक, लाक्षेविप्रा, औरंगाबाद
७. मुख्य अभियंता, जलसंपदा विभाग, उत्तर महाराष्ट्र प्रदेश, नाशिक
८. मुख्य अभियंता, जलविज्ञान प्रकल्प, नाशिक
९. मुख्य अभियंता, जलसंपदा विभाग, पुणे
१०.मुख्य अभियंता,(पाटबंधारे) व सहसचिव, जलसंपदा विभाग, मंत्रालय, मुंबई ३२
११.मुख्य अभियंता,(जलसंपत्ती) व सहसचिव, जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१२.उपसचिव (सिंव्य) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१३.उपसचिव (जलसंपत्ती) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१४.अधिक्षक अभियंता व प्रशासक, लाक्षेविप्रा, नाशिक
१५.अधिक्षक अभियंता, लाक्षेविप्रा, औरंगाबाद
१६.अवर सचिव (जलसंपत्ती / नियोजन) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१७. अवर सचिव (सिंव्य/धोरण) जलसंपदा विभाग, मंत्रालय, मुंबई ३२
१८. सिंव्य (धोरण) संग्रहार्थ

APPENDIX - V

जल व भूमि व्यवस्थापन संस्था (वाल्मी)

(महाराष्ट्र शासन, जलसंपदा विभाग पुरस्कृत स्वायत्त संस्था)

पत्र पेटी क्र. ५०४, कांचनवाडी, पैठण रोड

औरंगाबाद -४३१००५, (महाराष्ट्र)

दूरध्वनी क्र. ०२४०-२३७९१५९-६१ Website : www.walmi.org

फॅक्स क्र. ०२४०-२३७९०३६ E-mail : admn@walmi.org

तातडीचे / हस्ते पोहोच

जा.क्र.वाल्मी/ आस्था-१/२३११ दिनांक :- ३१/०७/२०१३

प्रति,

प्रधान सचिव (जसंव्य व लाक्षेवि),
जलसंपदा विभाग,
मादाम कामा मार्ग, हुतात्मा राजगुरु चौक,
मंत्रालय, मुंबई-३२

(लक्षवेध : श्री रमेश निकुम, मुख्य अभियंता (पा) व सहसचिव)

विषय : **गोदावरी खोऱ्यातील जलाशयांचे एकात्मिक प्रवर्तनासाठी विनियम तयार करण्यासाठी अभ्यास गटाची नियुक्ती करणे बाबत.**

संदर्भ :
1) शासन निर्णय क्र. संकीर्ण २०१२/(८९१/१२)/२०१२ / सिंव्य (धोरण) मंत्रालय, मुंबई-३२ दिनांक २९ जानेवारी २०१३
2) शासन निर्णय क्र. संकीर्ण २०१२/(८९१/१२)/२०१२/ सिंव्य(धोरण) मंत्रालय, मुंबई-३२ दिनांक ७ मार्च २०१३
3) शासन निर्णय क्र.संकीर्ण २०१२/(८९१/१२)/ २०१२/ सिंव्य (धोरण) मंत्रालय, मुंबई-३२ दिनांक ३०.७.२०१३

शासनाचे संदर्भीय दिनांक २९ .१.२०१३ च्या निर्णयानुसार गोदावरी खोऱ्यातील पैठण धरणांच्या उर्ध्व बाजुकडील जलाशयांचे एकात्मिक प्रवर्तनासाठी विनियम तयार करण्यासाठी अभ्यास गटाची नियुक्ती करण्यात आली आहे. अभ्यास गटाचे अध्यक्ष म्हणून माझी नियुक्ती करण्यात आली आहे. शासनाचे दिनांक ७ मार्च २०१३ च्या निर्णयानुसार श्री आ.भ. पाटील (सरक) कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद यांचा विशेष निमंत्रित सदस्य म्हणून समावेश केला आहे. या अभ्यास गटाला अहवाल सादर करण्यासाठी संदर्भ क्र. ३ अन्वये दिनांक ३१.७.२०१३ पर्यंत मुदत वाढ देण्यात आली आहे. या अभ्यासगटाची आठवी बैठक दिनांक १८ ते २० जुलै २०१३ या कालावधीत होऊन या बैठकीत अहवाल तयार करण्यात आला. या अहवालाचे सादरीकरण दिनांक २३.७.२०१३ रोजी मुंबई येथे झाले. या अहवालाबाबत अभ्यासगटातील सदस्यांमध्ये मतभिन्नता आढळून आली आहे.

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२.० शासनाने दिनांक २९.१.२०१३ च्या निर्णयानुसार अभ्यासगटाची कार्यकक्षा निश्चित केली आहे. त्यानुसार कार्यकक्षा (१) खालील प्रमाणे आहे –

"गोदावरी खोऱ्यातील जायकवाडी धरणाच्या उर्ध्व बाजुस खोरे / उपखोऱ्यातील सर्व जलाशयांचे एकात्मिक पध्दतीने पावसाळयात धरणे भरतांना जायकवाडी प्रकल्पाचे जलाशयांत टंचाई परिस्थिती न उदभवण्यासाठी प्रचलन करणे बाबतीत मार्गदर्शक विनियम तयार करणे."

वरील कार्यकक्षेमध्ये नमुद केल्याप्रमाणे जायकवाडी जलाशयात टंचाई परिस्थिती न उदभवण्यासाठी उर्ध्व बाजुकडील जलाशयांचे एकात्मिक पध्दतीने प्रचलन करणे, एवढयाच मर्यादित कार्यकक्षेमध्ये अभ्यास गटाने काम करणे शासनास अभिप्रेत आहे असे अभ्यास गटातील बहुतांशी सदस्यांचे मत आहे. महाराष्ट्र जलसंपत्ती नियमन प्राधिकरण नियम, २०१३ मध्ये पाणी टंचाईची व्याख्या केली असून जेव्हा उपयुक्त साठयाची प्रत्यक्ष उपलब्धता ही दिनांक १५ ऑक्टोंबर रोजी त्या प्रकल्पाच्या संकल्पित उपयुक्त असलेल्या साठयाच्या ३३ टक्के पेक्षा कमी असेल ती स्थिती असा आहे. ही व्याख्या विचारात घेतल्यास जायकवाडी जलाशयांमध्ये १५ ऑक्टोंबर रोजी ३३ टक्के एवढे उपयुक्त साठा / पाणी प्राप्त करण्याच्या मर्यादेत उर्ध्व बाजुकडील जलाशयांचे एकात्मिक पध्दतीने प्रचलन करणे बाबत मार्गदर्शक विनियम तयार करणे, एवढया मर्यादेत कार्यकक्षा अभ्यास गटास शासनाने नेमुन दिली आहे, असे बहुतांशी सदस्यांचे मत आहे. मात्र अभ्यास गटाच्या अध्यक्षांची भूमिका वेगळी असून महाराष्ट्र जलसंपत्ती नियमन प्राधिकरण अधिनियम २००५ तसेच राज्याची जलनिती मध्ये नमूद केल्याप्रमाणे उपखोऱ्यातील उपलब्ध असलेल्या पाण्याचे जवळजवळ समन्यायी व न्याय वाटप करणे (Approximate equitable and judicious distribution) या तत्वावर उपखो-यातील जलाशयांचे एकात्मिक पध्दतीने पावसाळयात धरणे भरतांना प्रचलन करण्यासाठी मार्गदर्शक विनिमय अभ्यासगटाने तयार करणे अभिप्रेत आहे. अशीच भूमिका मा. उच्च न्यायालय, औरंगाबाद खंडपीठ, येथे जनहित याचिका क्रं. १००/२०१२ मध्ये शासनाने प्रतिज्ञापत्रामध्ये नमूद केलेली आहे. तरी अभ्यास गटाने कार्यकक्षा क्रं. १ मध्ये नमूद केलेल्या मर्यादेत मार्गदर्शक विनिमय तयार करावेत किंवा कसे ? यावर शासनाचे मार्गदर्शन अत्यंत तातडीने आवश्यक आहे.

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३.० या अभ्यास गटातील एक सदस्य श्री ब.म.सुकरे, मुख्य अभियंता व मुख्य प्रशासक, लाभक्षेत्र विकास, औरंगाबाद हे दिनांक ३१-७-२०१३ रोजी सेवानिवृत्त होत आहेत. त्यांच्या सेवानिवृत्तीनंतर अभ्यास गटावर एका सदस्याची नियुक्ती नव्याने करण्यात यावी.

या अभ्यासगटाचे अध्यक्ष श्री हि.ता. मेंढेगिरी, महासंचालक, वाल्मी हे असून त्यांचेपेक्षा वरिष्ठ असलेले श्री आ.भ. पाटील (सरक), कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद हे विशेष निमंत्रित आहेत. कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळाचा अतिरिक्त कार्यभार माझ्याकडे असताना (डिसेंबर, २०१२) हा अभ्यासगट नेमण्याचा प्रस्ताव तयार करण्यात आला होता. त्यावेळी कार्यकारी संचालक, पदाचाही अतिरिक्त कार्यभार माझ्याकडे असल्यामूळे मी या गटाचा अध्यक्ष होण्यास संमती दिली होती. तदनंतर महामंडळाचा कार्यभार माझ्याकडे न राहिल्यामूळे अभ्यास गटाचे अध्यक्ष म्हणून मला नेमू नये अशी विनंती अनौपचारीकपणे शासनाचे दिनांक २९.१.२०१३ चे आदेश निर्गमित होण्यापूर्वी मी त्यावेळचे प्रधान सचिव (जसंव्य व लाक्षेवि) यांना विनंती केली होती. अभ्यास गटाच्या बैठकीमध्ये वरिष्ठतेचा प्रश्न उपस्थित होऊन काही सदस्यांमध्ये गैरसमज झाले आहेत. त्यामुळे या अभ्यासगटाचे अध्यक्ष म्हणून श्री आ.भ. पाटील (सरक), कार्यकारी संचालक, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ, औरंगाबाद यांची तसेच श्री हि.ता. मेंढेगिरी ,महासंचालक, वाल्मी यांची विशेष निमंत्रित सदस्य म्हणून नियुक्ती करणे योग्य होईल.

वरील प्रमाणे या अभ्यासगटाच्या संदर्भात उपस्थित केलेल्या मुद्यांवर शासन स्तरावर निर्णय होऊन तातडीने आदेश निर्गमित करावेत, ही विनंती.

(हि.ता.मेंढेगिरी)
महासंचालक,
वाल्मी, औरंगाबाद तथा
अध्यक्ष अभ्यास गट

प्रत: श्री ए.पी. कोहिरकर, अधीक्षक अभियंता, गोदावरी मराठवाडा पाटबंधारे विकास महामंडळ,औरंगाबाद तथा सदस्य सचिव यांना माहितीस्तव

APPENDIX - VI

ईमेल :- wrd cad do lmp@maharashtra.gov.in
दूरध्वनी :- ०२२-२२०२७८९५/२२७१४१६१
फैक्स :- ०२२-२२०२३२१३/२२८३४३३५/२२८३१८५७

महाराष्ट्र शासन

क्र -- संकीर्ण २०१२/(८९१/१२)/सिंव्य(धो)

जलसंपदा विभाग,
मादाम कामा मार्ग,
हुतात्मा राजगुरु चौक,
मंत्रालय, मुंबई ४०० ०३२.
दिनांक :- ६/०८/२०१३.

प्रति,

महासंचालक,
वाल्मी,औरंगाबाद तथा
अध्यक्ष,अभ्यास गट

विषयः- गोदावरी खोऱ्यातील जलाशयाचे एकात्मिक प्रवर्तनासाठी विनियम तयार करण्यासाठी अभ्यास गटाची नियुक्ती करणेबाबत .

संदर्भ :-१)शासन निर्णय क्र. संकीर्ण २०१२/(८९१/१२)/२०१२/सिंव्य (धोरण) दि. ३१.०७.२०१३.
२)आपले पत्र क्र. वाल्मी/आस्था-१/२३११, दि. ३१.०७.२०१३.

विषयांकित अभ्यास गटाच्या समितीस संदर्भ क्र.१ येथील शासन निर्णयाव्दारे दिनांक ३१.०७.२०१३ पर्यंत मुदतवाढ देण्यात आलेली आहे. सदर अभ्यास गटाच्या अभ्यासावर दिनांक २३.०७.२०१३ रोजी विधानभवनात मा. मंत्री जलसंपदा(कृखोपाम वगळून), प्रधान सचिव (जसं), प्रधान सचिव (लाक्षेवि) व सर्व समितीच्या सदस्यांसमवेत सादरीकरण होऊन सविस्तर चर्चा झाली. चर्चेनुसार गोदावरी खोऱ्यातील जलाशयाचे एकात्मिक प्रवर्तनासाठी विनियम तयार करताना शासन निर्णय २९.०१.२०१३ मधील कार्यकक्षा - १ 'गोदावरी खोऱ्यातील जायकवाडी धरणाच्या उर्ध्व बाजूस खोरे उपखोऱ्यातील सर्व जलाशयांचे एकात्मिक पध्दतीने पावसाळ्यात धरणे भरताना जायकवाडी प्रकल्पाच्या जलाशयात टंचाई परिस्थिती न उद्भवण्यासाठी प्रचलन करणे बाबतीत मार्गदर्शक विनियम तयार करणे अनुसार तातडीने करावयाच्या उपाययोजना तसेच तद्नुसार आपणास अभिप्रेत असलेली दीर्घकालीन उपाययोजना (Long Term) अंतर्भूत करुन अंतिम अहवाल तयार करावा, असे सुचविण्यात आले होते.

ईमेल :- wrd cad do imp@maharashtra.gov.in
दूरध्वनी :- ०२२-२२०२७८९५/२२७९४९६१
फॅक्स :- ०२२-२२०२३२७३/२२८३४३३५/२२८३९८७७

तसेच समितीचे अध्यक्ष व सर्व सदस्यांच्या एकमताने अहवाल सादर करण्याच्या सुचना देखील देण्यात आलेल्या आहेत.

पावसाळी अधिवेशन कालावधीत लोकप्रतिनिधींनी मराठवाड्याकरिता पाणी सोडण्याबाबत लक्षवेधी व तारांकित प्रश्न उपस्थित करुन तीव्रतेने भावना व्यक्त केल्या आहेत. उपरोक्त सर्व बाबींचा विचार करता या प्रकरणी असे सुचित करण्यात येत आहे की, अभ्यास गटाची रचना पूर्वी प्रमाणेच कायम राहील. तरी दि. २३/७/२०१३ रोजीच्या बैठकीत चर्चा झाल्याप्रमाणे अभ्यास गटाचा अंतिम अहवाल तात्काळ शासनास सादर करण्यात यावा.

(उ. ए. कुंभारे)
शासनाचे अवर सचिव

प्रत :-

१) स्वीय सहायक, प्रधान सचिव (लाक्षेवि)
२)सिंव्य(धो) कार्यासन संग्रहार्थ

Annexure -1

Information about Major, Medium and Minor Irrigation Projects in Upper Godavari (up to Paithan dam) Sub Basin

Sr. No	Name of System	Total Catchment area of system (Sqkm)	Design Storage (Mcum)				Design Water Use (Mm^3)	Storage excluding Silt as per Survey (Mm3)		Estimated Annual Evaporation Losses (Mm3)	Type of Overflow Section (Gated/Ungated)	Storage against Spillway Gates (Mm^3)	Gross Storage below Crest of Spillway/ w.weir (Mm^3)	Spillway Design Discharge (Cumecs)	Canal Outlet Design Discharge (Cumecs)		River Sluice Design Discharge (Cumecs)	Power Outlet Design Discharge (Cumecs)
			Dead	Live	Carry Over	Gross		Dead	Live						L.B.C.	R.B.C.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A	Mula system																	
1	Mandohal Medium Project		2.520	8.780	0.000	11.300	13.160	Not Surveyed	Not Surveyed	1.430	Ungated	0.000	11.300	1420.000	0.000	1.160	N. A.	N. A.
2	M.I.& KTW (State) (35 Nos.)		14.270	76.800	0.000	91.070	76.800	Not Surveyed	Not Surveyed	3.661	Gated/Ungated	N. A.	91.070	N. A.	N. A.	N. A.	N. A.	N. A.
3	Mula Dam	2275	127.420	608.810	28.320	736.210	704.630	117.356	579.090	76.450	Gated	337.250	398.980	5946.000	7.080	46.720	N. A.	N. A.
4	Sanctioned Kharif Util on Reservoir and River over and above Project planning						20.720											
5	Local Sector (46)		0.000	14.220	0.000	14.220	14.220											
	Total (A) Mula System		144.210	708.610	28.320	852.800	829.530											
B	Pravara system																	
1	Bhandardara Dam (CA 120.00)		8.500	304.100	0.000	312.600	0.000	8.500	298.420	91.541	ungated	0.000	14.220					
2	Nilwande Dam (CA202.21)		7.250	228.750	0.000	236.000	351.770	Not Surveyed	Not Surveyed	12.740	Gated	337.250	515.570					
3	M.I.(State) above 250 ha @ U/S Of Nilwande Dam =3 nos		1.410	14.860	0.000	16.270	17.400	Not Surveyed	Not Surveyed	12.600	Gated	121.690	190.910	1503.000	0.000	0.000	28.320	23.780
4	Sanctioned Kharif Util on Bhandaradara & Nilwande Reservoir and Pravara River upto Ozer weir over and above Project planning						52.089			1.627	Ungated	50.730	185.270	3700.000	50.000		50.000	LLPO+ICPO
5	Adhala Dam (CA 177.10)											0.000	16.270	0.000	By Lift		--	0.000
6	M.I.(State)above 250 ha. @ U/S Of Adhala Dam = 2 Nos		2.420	27.610	0.000	30.030	38.730	Not Surveyed	Not Surveyed	3.120	Ungated	--	30.030	1582.000	1.190	1.920	--	0.000
7	Sanctioned Kharif Util on Adhala Reservoir and Adhala River over and above Project planning		1.460	4.700	0.000	6.160	6.160	Not Surveyed	Not Surveyed	0.060	Ungated	0.000	6.160	0.000	By Lift		--	0.000
8	Bhojapur (CA 154.00)						5.799											
9	Bhojapur Flood canals		3.030	10.310	0.000	13.340	10.700	Not Surveyed	Not Surveyed	1.360	Ungated	0.000	13.340	1489.000	6.080	--	--	--
10	M.I. @ D/S Nilwande & U/S upto Ozar Weir . Nil						7.117											
11	Ozar Weir (Bhandardara Water use of 421.90 is from Ozar weir)	1608.00	0.000	0.000	0.000	0.000	0.000	Not Surveyed	Not Surveyed	0.000	Ungated	0.000	0.000	0.000	0.000	0.000	--	
14	M.I. (Local.Sector.) in Pravara basin (86 Nos)		0.000	35.500	0.000	35.500	35.500	N.A	N.A	0.000	Ungated	0.000	0.000	2837.000	30.020	9.710	--	0.000
	Total of (B) Pravara System		24.070	625.830	0.000	649.900	959.905			31.507		172.420	477.480					
C	Gangapur System																	
1	Kikwi (CA 69.99)		10.340	60.020	0.000	70.360	45.210	Under Constr	Under Constr	10.210	Ungated	0.000	70.360	452.747	NA	NA	NA	NA
2	Guatami Godavari(CA 41.18)		0.318	52.930	0.000	53.248	54.680	Not Surveyed	Not Surveyed	2.730	Gated	11.678	41.570	1234.710	0.000	0.000	0.000	4.290
3	Kasyapi (CA 46.10)		0.950	51.747	0.000	52.697	55.310	Not Surveyed	Not Surveyed	2.630	Gated	14.580	38.120	798.710	0.000	0.000	0.000	4.168
4	Gangapur	357.40	12.000	203.880	5.660	215.880	169.610	----	159.420	21.670	Gated	137.010	78.870	2294.000	11.740	3.820	0.000	0.000
5	Alandi	74.59	2.060	27.470	0.000	29.530	40.670	Not Surveyed	Not Surveyed	2.850	Ungated	0.000	29.530	1019.500	5.380	1.000	--	--
6	M.I.(State)>250 (7 Nos.)		1.640	26.660	0.000	28.300	26.660	Not Surveyed	Not Surveyed	4.245	Ungated	0.000	28.300	0.000	0.000	0.000	0.000	0.000
8	Sanctioned Kharif Util on Reservoir and River over and above Project planning						29.520											
9	Local Sector (69)		0.000	24.540	0.000	24.540	24.540											
	Total of (C) Gangapur System		27.308	447.247	5.660	474.555	446.200			44.335	ungated	0.000	24.540					
												163.268	311.290					

Annexure -I

Information about Major, Medium and Minor Irrigation Projects in Upper Godavari (up to Paithan dam) Sub Basin

Sr. No.	Name of System	Total Catchment area of system (Sqkm)	Design Storage (Mcum)				Design Water Use (Mm^3)	Storage excluding Silt as per Survey (Mm3)		Estimated Annual Evaporation Losses (Mm3)	Type of Overflow Section (Gated/Ungated)	Storage against Spillway Gates (Mm^3)	Gross Storage below Crest of Spillway/ w.weir (Mm^3)	Spillway Design Discharge (Cumecs)	Canal Outlet Design Discharge (Cumecs)		River Sluice Design Discharge (Cumecs)	Power Outlet Design Discharge (Cumecs)
			Dead	Live	Carry Over	Gross		Dead	Live						L.B.C.	R.B.C		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
D	Kadwa System																	
1	Upper Kadwa		2.770	13.690	0.000	16.460	17.180	Yet to	Yet to construct	3.350	Ungated	0.000	16.460	982.530	--	0.934	--	NA
2	Kadwa	173.23	6.680	52.900	0.000	59.580	80.700	5.120	47.780	10.273	Gated	39.230	20.350	2821.350	--	11.390	--	ICPO
3	Sanctioned Kharif Util on Reservoir and River over and above Project planning						1.173											
	Total of (D) Kadwa System		9.450	66.590	0.000	76.040	99.053			13.623		39.230	36.810					
E	Darna system																	
1	Bhawali (CA 25.90)		3.960	40.790	0.000	44.750	18.640	Not Surveyed	Not Surveyed	5.320	Ungated	0.000	44.750	662.000	--	--	8.320	--
2	Bham (CA 50.50)		5.660	69.760	0.000	75.420	8.770	Under Constru	Under Constru	8.770	Ungated	0.000	75.420	990.000	--	--	7.560	--
3	Waki (CA 32.50)		5.230	70.570	0.000	75.800	12.850	Under Constru	Under Constru	12.850	Gated	24.800	51.000	550.000	--	--	--	7.560
4	Darna (CA 404.00)	404.00	7.050	219.820	0.000	226.870	47.890	--	202.410	43.330	Gated	105.070	121.800	3335.760	--	--	--	29.230
5	Mukane	129.60	9.180	204.980	0.000	214.160	102.460	Not Surveyed	Not Surveyed	28.060	Gated	84.690	129.470	1968.000	--	--	16.120	
6	Waldevi	51.84	1.920	32.090	0.000	34.010	20.760	Not Surveyed	Not Surveyed	5.000	Ungated	0.000	34.010	809.000	--	--	--	7.930
7	N.M.Weir	4218.00	0.000	29.910	0.000	29.910		1.220	7.270	1.091	Gated	7.270	1.220	2832.000	12.040	21.840		0.000
	a) N M Express canal Mukane-111.70 Bham-66.28, Bhawali-28.09 Waki-57.72, Free catch-181.25						445.050								31.036			
	b) Godavari canals Gangapur 34.27+return flow-27.47, Darna-203.85, Waldevi-16.14, Gautami Godavari-52.90, Free catchment-107.62						442.240											
	c) Transit and Evaporation Losses (8.24+15.97+21.67)						45.880											
8	M.I.(State)>250 (27 Nos.)		6.590	89.730	0.000	96.320	96.320	----	----	14.448	Ungated	0.000	96.320	----	--	--	--	--
11	Sanctioned Kharif Util on Reservoir and River over and above Project planning						8.045											
12	Local Sector (5)		0.000	1.520	0.000	1.520	1.520											
	Total of (E) Darna System		39.590	759.170	0.000	798.760	1250.425			118.869	ungated	0.000	1.520					
F	Palkhed system	824										221.830	555.510					
1	Karanjwan (248)		9.340	166.220	0.000	175.560	24.920	9.340	152.090	16.990	Gated	74.670	100.900	2724.000	3.256	0.000	24.690	12.630
2	Waghad (119)		4.250	72.230	0.000	76.480	46.290	4.250	70.840	7.080	Ungated	0.000	76.480	1350.000	1.416	12.742	N.A.	N.A.
3	Punegaon (66)		2.815	17.570	0.000	20.390	0.030	Not Surveyed	Not Surveyed	2.240	Gated	13.190	7.190	1.70.000	2.832	0.000	N.A.	N.A.
4	Ozarkhed (182-including C.A. of Punegaon) (Ozarkhed LBC, Punegaon LBC, Daraswadi Feeder)		7.640	60.320	0.000	67.960	105.290	Not Surveyed	Not Surveyed	8.270	Ungated	0.000	67.960	2400.000	13.590	0.000	N.A.	N.A.
5	Palkhed (275) (PLBC-229.33, PRBC- 22.37)		1.770	21.240	0.000	23.010	279.180	Not Surveyed	Not Surveyed	8.100	Gated	18.992	4.018	4592.000	25.940	1.359	N.A.	N.A.
6	Sanctioned Kharif Util on Reservoir and River over and above Project planning						19.810											
7	Tisgaon system	97	2.700	12.760	0.000	15.460	0.840	Not Surveyed	Not Surveyed	3.200	Ungated	0.000	15.460	1604.000	0.000	6.110	N.A.	N.A.
8	Sanctioned Kharif Util on Reservoir and River over and above Project planning						0.640											
9	M.I.(State) (8 Nos.)		0.642	19.694	0.000	20.336	19.694	Not Surveyed	Not Surveyed	3.050	gated/ungated	0.000	20.336	--	--	--	N.A.	N.A.
10	Local Sector (23)		0.000	9.210	0.000	9.210	9.210	N.A	N.A.	0.000	ungated	0.000	9.210	--	--	--	N.A.	N.A.
	Total (F) Palkhed System		29.157	379.244	0.000	408.416	505.874			48.930		106.852	301.554					

Annexure -I

Information about Major, Medium and Minor Irrigation Projects in Upper Godavari (up to Paithan dam) Sub Basin

Sr. No.	Name of System	Total Catchment area of system (Sqkm)	Design Storage (Mcum)				Design Water Use (Mm^3)	Storage excluding Silt as per Survey (Mm3)		Estimated Annual Evaporation Losses (Mm3)	Type of Overflow Section (Gated/Ungated)	Storage against Spillway Gates (Mm^3)	Gross Storage below Crest of Spillway/ w.weir (Mm^3)	Spillway Design Discharge (Cumecs)	Canal Outlet Design Discharge (Cumecs)		Rives Sluice Design Discharge (Cumecs)	Power Outlet Design Discharge (Cumecs)
			Dead	Live	Carry Over	Gross		Dead	Live						L.B.C.	R.B.C.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
G	U/s of Jayakwadi																	
1	Below Mula Dam M.I.& KTW (State) (4 Nos.)		0.000	12.070	0.000	12.070	12.070	Not Surveyed	Not Surveyed	1.811	Gated /Ungated	0.000	12.070	N. A.	N. A.	N. A.	N. A.	N. A.
2	Below NMW																	
	KT Weirs below NMW(12)		0.000	60.220	0.000	60.220	60.220			9.033	Gated	0.000	60.220	N A	N A	N A	N A	N A
	MI Tanks (SS) 1 below NMW		0.030	1.340	0.000	1.370	1.340			0.201	Ungated	0.000	1.370	N A	N A	N A	N A	N A
3	a) M.I.(State)above 250 ha. @ D/S Of Ozar Weir = 2 Nos (CA 69.55)		0.570	2.510	0.000	3.080	3.560	Not Surveyed	Not Surveyed	0.308	Ungated	0.000	3.080	.--	0.390	0.000	.--	0.000
	b) K.T(State) . @ D/S Of Ozar Weir .K.T.=.12 Nos		0.000	28.380	0.000	28.380	28.380	Not Surveyed	Not Surveyed	2.838	Gated	0.000	28.380	.--			.--	0.000
4	M.I.& KTW (Adjacent to Mula) (State) (3 Nos.)		0.520	2.080	0.000	2.600	2.080	Not Surveyed	Not Surveyed	0.390	gated/ungated	0.000	2.600	N. A.	N. A.	N. A	N. A.	N. A.
	Total of (G)		1.120	106.600	0.000	107.720	107.650			14.581		0.000	107.720					
H	Jayakwadi System (U/S Paithan Dam)																	
1	Tembhapuri(CA 283.83)		1.660	19.610	0.000	21.270	22.130	Not Surveyed	Not Surveyed	5.360	Ungated	0.000	21.270	2043.150	0.000	2.560	N.A.	N.A.
2	Dheku(CA 259)		1.360	12.170	0.000	13.530	13.530	Not Surveyed	Not Surveyed	5.110	Ungated	0.000	13.530	1924 000	1.090	0.000	N.A.	N.A.
3	Kolhi(CA 42)		0.400	3.240	0.000	3.640	3.950	Not Surveyed	Not Surveyed	1.520	Ungated	0.000	3.640	697.000	0.310	0.000	N.A.	N.A.
4	Narangi(CA 176.3)		1.795	11.495	0.000	13.290	13.300	Not Surveyed	Not Surveyed	4.926	Gated	11.490	1.795	1296.300	0.930	0.450	N.A.	N.A.
5	Bor Dahegaon(CA 196)		1.930	11.470	0.000	13.400	15.100	Not Surveyed	Not Surveyed	5.410	Gated	11.470	1.930	2000.000	0.760	0.340	N.A.	N.A.
6	Ambadi(CA 141)		2.340	9.420	0.000	11.760	12.760	Not Surveyed	Not Surveyed	2.850	Ungated	0.000	11.760	1414 000	0.220	0.937	N.A.	N.A.
7	Shivana Takli (CA 574.82)		2.310	37.060	0.000	39.360	44.220	Not Surveyed	Not Surveyed	6.969	Gated	34.190	5.170	327: 000	2.100	3.950	N.A.	N.A.
8	Total MI(State) Projects (41)		9.717	94.942	0.000	104.660	103.488	Not Surveyed	Not Surveyed	25.111	Ungated	0.000	104.660		--	--	N.A.	N.A.
9	Total MI (L.S.) in Upper Godavari Aurangabad District - Total- 172	--	0.000	44.000	0.000	44.000	44.000	Not Surveyed	Not Surveyed	0.000	Ungated	0.000	44.000	0.000	0.000	0.000	N.A.	N.A.
10	Bramhagavan LIS II (85 Mcum)						85.000											
	Total of (H) U/s of Paithan Dam		21.512	243.407	0.000	264.910	357.478			57.256		57.150	207.755					
	Grand Total (A to H)		296.417	3336.699	33.980	3633.101	4556.115			420.641		1098.000	2513.689					
							160.993	TMC										
1	Paithan dam	21774.00	738.106	2170.935	381.700	2909.041	2618.590	509.000	1867.000	664.830	Gated	2098.000	810.650	18150.003	101.940	63.710	N.A	50.000
	a) Tajnapur LIS I (45.77 Mcum)																	
	b) Bramhagavan LIS I (27.518 Mcum)																	
	c) Tajnapur LIS II (63.977 Mcum)																	
	Total (137.265 Mcum)																	
	d) Sanctioned individual lifts on Reservoir and River over and above Project planning (64.88 Mcum)																	
	Grand Total including Paithan dam		1034.523	5507.634	415.680	6542.142	7174.705			1085.471		3196.000	3324.339					

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(A.B. Patil) E.E.

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Godavari Marathwada Irrigation
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Annexure -2

Information about availability of yield at various locations in Upper Godavari (up to Paithan dam) sub-basin

(All figures in Mm3)

Sr No.	Name of Dam	Annual virgin yield including p.m. flow (Design)						Planned u/s utilisations (Design)	Net annual yield including p.m. flow (Design)					Regeneration Flow (Design)	Observed Net Yield					
		100% dep	90% dep	75% dep	50% dep	Average	Year of Study		100% dep	90% dep	75% dep	50% dep	Average		100% dep	90% dep	75% dep	50% dep	Average	Data period
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
A	**Mula system**																			
1	Mandoshal Medium Project				13.300		N. A.	0.300				13.300		0.000	1.270	2.880	3.910	14.280	20.530	1991 to 2012
2	Mula Dam (Designed for 70% Dependability)	328.670	419.350	696.500	822.600	811.690	1999	0.200	328.670	419.350	696.500	822.600	811.690	0.000	328.670	498.650	631.260	756.650	801.330	1961 to 2012
B	**Pravara system**																			
1	Bhandardara Dam (CA 120.00)	289.367	433.270	480.160	546.450	547.590	1993	0.300	289.367	433.270	480.160	546.450	547.590	0.000	237.700	317.630	389.020	447.330	472.020	1976-2012
2	Nilwande Dam (CA202.21)	N.A	N.A.	598.820	693.480	702.790	1993	421.908	N.A.	N.A.	176.920	271.580	280.890	0.000	199.300	268.500	304.200	341.020	275.740	1982 to 2012
3	Adhala Dam	N.A.	34.430	42.470	56.920	56.920	1966	0.300	N.A.	34.430	42.470	56.920	55.920	0.000	7.250	15.710	22.340	33.780	35.080	1991 to 2012
4	Bhojapur (CA 134.00)	N.A	N.A.	N.A.	35.680	38.510	1970	0.300	N.A.	N.A.	N.A.	35.680	38.510	0.000	5.408	10.222	13 790	23.590	31.221	1973-2012
5	Ozar Weir	420.130	677.300	770.430	944.460	1046.130	1966	796.380	0.000	0.000	0.000	147.580	249.250	0.000	45.220	139.650	206.080	290.670	342.890	1976 to 2012
C	**Gangapur System**																			
1	Kikwi (CA 69.90)	35.440	41.900	59.930	68.060	72.570	2009	0.300	35.440	41.900	59.930	68.060	72.570	0.000	NA	NA	NA	NA	NA	-
2	Gautami Godavari(CA 4	17.000	30.000	44.500	53.000	55.620	1985	0.300	17.000	30.000	44.500	53.000	55.620	0.000	32.180	38.620	61 290	84.140	72.150	2006-07
3	Kasvpi (CA 46.10)	8.960	28 920	49.770	59.600	34.920	1985	8 594	2.060	22.020	42.870	52.700	28.020	0.000	26.150	47.100	48 750	52.140	48.050	2005-12
4	Gangapur	118.930	163.100	214.850	295.910	284.580	1954	-	118.930	163.100	214.850	295.910	284.560	0.000	179.570	224.765	266.544	291.885	344.708	1996-2012
5	Alandi	6.970	23.320	42.200	50.770	51.890	1974	0.400	6.970	23.320	42 200	50.770	51.890	0.000	20.218	25.670	30 270	40.900	58.850	1994-2012
D	**Kadwa System**																			
1	Upper Kadwa																			
2	Kadwa	56.480	71.730	85.740	105.520	130.540	1979	3.760	52.720	67.970	81 980	101.760	126.780	0.000	47.657	92.680	102.279	130.398	148.758	2000-2012
E	**Darna system**																			
1	Bhawali (CA 25.90)																			
2	Bham (CA 50.50)																			
3	Waki (CA 32.50)																			
4	Darna (CA 404.00)	273 790	463.210	596.517	709.440	686.120	1906-1926	0.000	273.790	463.210	596.517	709.440	686.120	0.000	294.379	433.900	514 000	656.160	712.082	1976-2012
5	Mukane	87.753	148.465	191.191	227.385	219.910	1979	0.000	87.753	148.465	191.191	227.385	219.910	0.000	70.140	77.660	103.660	135.940	158.720	1994-2012
6	Waldevi (Designed for 50% Dependability)	19.380	29.220	31.560	42.150	44.270	1999	0.250	19.130	28.970	31.310	41.900	44.020	0.000	28.741	30.847	54.560	69.683	76.680	2003-2012
10	N M Weir (													31.990	197.763	575.25	687.746	885.250	1385.738	1976-2012
	NM Weir (Virgin)			2004.000				2261.800												
F	**Palkhed system**																			
1	Karanjwan (248)	N A	N A	173.300	N A	N A	1966	12.836	N A	N A	160.484	N A	N A		57.140	90.330	115.980	156.850	158.033	1981 to 12
2	Waghad (119)	N A	N A	92.880	N A	N A	1966	5.250	N A	N A	87.620	N A	N A		42.390	51.650	71.920	74.050	86.533	1981 to 12
3	Punegaon (66)														4.420	6.570	8.610	17.560	20.970	1997 to 12
4	Ozarkhed (182-including C A of Punegaon)	N A	N A	92.310	N A	N A	1966	23.930	N A	N A	68.380	N A	N A		20.810	24,150	33.330	55.730	59.479	1981 to 12
5	Palkhed system (275)	206.711	297.324	444.570	571.995	668.271	1966	166.550	39.761	130.374	277.620	405.045	531.321	0.000	17.330	21.150	29.880	64.320	127.500	1981 to 12
	Palkhed (virgin)														182.190	223.310	267.900	326.380	378.360	1981 to 12
6	Tisgaon system	N A	N A	N A	25.620	N A	1993	0.635	N A	N A	N A	24.785	N A	0.000	0.820	3.040	6.800	9.200	16.250	1997 to 12
G	**Jayakwadi System**																			
1	Tembhapuri	6.860	15.260	20.930	29.390	33.970	1976	3.510	2.950	11.350	17.020	25.480	30.060	1.300	4.230	5.960	7.250	10.250	8.170	1984-2012
2	Dheku	0.226	1.244	2.874	4.520	2.160	1957	0.080	0.226	1.244	2.874	4.520	2.160	0.000	0.000	0.000	2.161	4.010	1.842	1996-2012
3	Kolhi	0.287	1.954	2.995	4.757	2.498	1964	0.080	0.287	1.954	2.995	4.757	2.498	0.000	0.000	0.000	0.798	1.300	0.844	1984-2012

Sr No	Name of Dam	Annual virgin yield including p.m. flow (Design)						Planned u/s utilisations (Design)	Net annual yield including p.m. flow (Design)					Regeneration Flow (Design)	Observed Net Yield					
		100% dep	90% dep	75% dep	50% dep	Average	Year of Study		100% dep	90% dep	75% dep	50% dep	Average		100% dep	90% dep	75% dep	50% dep	Average	Data period
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
4	Narangi	0.000	7.990	10.950	14.660	13.830	1992	0.000	0.000	7.990	10.950	14.660	13.830	0.000	0.000	0.000	1.790	3.260	1.260	1998-2012
5	Bor Dahegaon	0.000	9.200	12.760	17.020	16.050	1992	0.000	0.000	9.200	12.750	17.020	16.050	0.000	0.000	0.000	1.533	4.536	1.517	1998-2012
6	Ambadi	2.480	3.800	9.500	16.830	8.900	1969	0.000	2.480	3.800	9.500	16.830	8.900	0.000	0.322	4.160	6.050	10.740	5.310	1982-2012
7	Shivana Takli	41.630	43.070	75.630	115.052	142.540	1976	51.531	0.000	0.000	24.099	63.521	91.009	0.000	10.580	15.300	22.560	39.680	45.950	2006-2012
8	Jayakwadi dam	3184.000	4751.000	5566.000	6634.000	6956.000	1985	3270.000	0.000	1481.000	2296.000	3364.000	3686.000	343.520	122.050	528.790	816.530	2067.510	2356.340	1975-2012

Supdt. Engr. C.B.Aibad.

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Annexure -3

Information about Water Requirement (Demand) from various Reservoirs / Dams (Major & Medium projects)in Upper Godavari (up to Paithan dam) sub-basin

(All Figures in Mm3)

Sr.No	Name of Dam/ System	Live Storage excluding Silt (As per Survey)	Planned Irrigation use				Annual non- irrigation demands (Sanctioned)						Design Evaporation Losses					Contingency Rural Domestic Requirment
			Kharif	Rabi	HW	Annual	Domestic use	Industrial use	Hydro power	Mandatory demand (if any)	Total NI	NI provision in Project Report	Kharif	Rabi	H W	Annual	Total Annual Water Use	
1	2	3	4	5	6	7	8	9	10	11	11A	11B	12	13	14	15	15A	16
A	**Mula system**																	
1	Mandohal	8.780	4.310	7.410	0.000	11.720	1.230	0.000	0.000	0.000	1.230	0.000	N. A.	N. A.	N. A.	1.430	13.150	N. A.
2	Mula Dam	579.090	168.440	400.600	0.000	569.040	95.270	15.090	0.000	0.000	110.360	59.120				76.450	704.610	2.83Collector's Reservation
	Sanctioned **Kharif** Util on Reservoir and River over and above Project planning		20.720															
	Total (A)	**587.870**	**193.470**	**408.010**	**0.000**	**580.760**	**96.500**	**15.090**	**0.000**	**0.000**	**111.590**	**59.120**	**0.000**	**0.000**	**0.000**	**77.880**	**717.760**	
B	**Pravara system**																	
1	Bhandardara Dam	298.420	117.800	139.800	164.300	421.900	43.330	23.427	0.000	0.000	66.757	0.000	NA	NA	NA	12.740	434.640	3.054
2	Nilwande	228.750	128.160	197.860	0.000	326.020	13.150	0.000	0.000	0.000	13.150	13.150	NA	NA	NA	12.600	351.770	0.000
	Sanctioned **Kharif** Util on Bhandaradara & Nilwande Reservoir and Pravara River upto Ozer weir over and above Project planning		52.089	0.000	0.000	52.089												
3	Adhala Dam	27.610	13.190	13.450	8.970	35.610	3.324	0.000	0.000	0.000	3.324		NA	NA	NA	3.120	38.730	0.000
	Sanctioned **Kharif** Util on Adhala Reservoir and Adhala River over and above Project planning		5.799	0.000	0.000	5.799												
4	Bhojapur	10.310	0.960	8.380	0.000	9.340	2.290	0.000	0.000	0.000	2.290		0.270	0.440	0.650	1.360	10.700	2.830
5	Bhojapur Flood canals		7.117	0.000	0.000	7.117												
	Total of B	**565.090**	**325.115**	**359.490**	**173.270**	**857.875**	**62.094**	**23.427**	**0.000**	**0.000**	**85.521**	**13.150**	**0.270**	**0.440**	**0.650**	**29.820**	**835.840**	
C	**Gangapur System**																	
1	Kikwi	60.020																
2	Gautami Godavari	52.900	13.900	30.400	8.600	52.900	20.810	0.000	0.000	0.000	20.810	35.000	0.000	0.000	0.000	10.210 1.680	45.210 54.580	4.70 Res.by colle.
3	Kashapi	51.750	7.670	7.850	3.200	18.720	18.670	0.000	0.000	0.000	18.670	33.960	0.000	0.000	0.000	2.630	55.310	16.98 Resv. by Colle.
4	Gangapur	159.420	0.000	77.760	71.210	148.970	67.540	55.560	0.000	0.000	123.100	2.830	3.860	9.030	8.780	17.810	169.610	108.48 Resv.by Colle.
5	Alandi system	27.470	9.910	27.910	0.000	37.820	0.000	0.063	0.000	0.000	0.063		NA	NA	NA	2.850	40.670	-
6	Sanctioned Kharif Util on Reservoir and River over and above Project planning		29.520															
	Total of C	**351.560**	**61.000**	**143.920**	**83.010**	**258.410**	**107.020**	**55.623**	**0.000**	**0.000**	**162.643**	**71.790**	**3.860**	**9.030**	**8.780**	**35.180**	**365.380**	

1	2	3	4	5	6	7	8	9	10	(if any) 11	11A	11B	12	13	14	15	15A	16
D	**Kadwa System**																	
	Upper Kadwa	13.690	2.950	9.510	1.370	13.830	0.000	0.000	0.000	0.000	0.000	0.000				3.350	17.180	
1	Kadwa	47.780	30.536	35.620	3.670	69.826	18.000	0.000	0.000	0.000	18.000	0.600	3.790	3.480	3.000	10.270	80.696	3.40 Reser. By Colle. For 2012-13
2	Sanctioned **Kharif** Util on Reservoir and River over and above Project planning		1.173															
	Total of D	**61.470**	**34.659**	**45.130**	**5.040**	**83.656**	**18.000**	**0.000**	**0.000**	**0.000**	**18.000**	**0.600**	**3.790**	**3.480**	**3.000**	**13.620**	**97.876**	
E	**Darna system**																	
1	Bham	40.790	0.000	0.000	0.000	0.000							1.810	3.200	3.760	8.780	8.780	
2	Bhawali	69.760	3.860	6.930	2.530	13.320	0.000	0.000	0.000	0.000	0.000	0.000	1.130	1.890	2.300	5.320	18.640	
3	Waki	70.570	0.000	0.000	0.000	0.000							2.570	5.520	4.760	12.850	12.850	
4	Darana	202.440	5.672	14.619	5.948	26.240	54.304	7.137	0.000	0.000	61.441					21.670	47.910	38.700
5	Mukane	204.980	0.650	1.160	0.430	2.240	19.680	2.600	0.000	0.000	22.280	72.160	8.260	10.870	8.930	28.060	102.460	0.99 Res By Colle.
6	Waldevi	32.090	6.970	15.110	2.640	24.720	0.120	12.180	0.000	0.000	12.300		1.480	2.060	1.450	5.000	29.720	5.66 Resv. by Colle.
7	NM WEIR	7.270																
	a) N M Express canal Mukane-111.70 Bham-66.28, Bhawali-28.09 Waki-57.72, Free catch-181.25		129.060	231.430	84.560	445.050											445.050	
	b) Godavari canals Gangapur 34.27+return flow-27.47, Darna-203.85, Mukane-61.43, Waldevi-16.14, Gautami Godavari-52.90, Free catchment-69.75		95.600	246.390	100.250	442.240											442.240	
8	Sanctioned **Kharif** Util on Reservoir and River over and above Project planning		8.045														0.000	
	Total of E	**627.900**	**249.857**	**515.639**	**196.358**	**953.810**	**74.104**	**21.917**	**0.000**	**0.000**	**96.021**	**72.160**	**15.250**	**23.540**	**21.200**	**81.680**	**1107.650**	

Sr.No	Name of Dam/ System	Live Storage excluding Silt (As per Survey)	Planned Irrigation use				Annual non- irrigation demands (Sanctioned)				Total NI	NI provision in Project Report	Design Evaporation Losses				Total Annual Water Use	Contingency Rural Domestic Requirment
			Kharif	Rabi	HW	Annual	Domestic use	Industrial use	Hydro power	Mandatory demand (if any)			Kharif	Rabi	H W	Annual		
1	2	3	4	5	6	7	8	9	10	11	11A	11B	12	13	14	15	15A	16
F	**Palkhed system**																	
1	Karanjwan	152.090	2.810	5.120	0.000	7.930	0.000	1.105	0.000	0.000	1.105	0.000				16.990	26.025	0.425 Resv. by Colle.
2	Waghad	70.840	12.310	26.900	0.000	39.210	0.000	0.000	0.000	0.000	0.000	0.000				7.080	46.290	3.54 Resv. by Colle.
3	Punegaon	17.570	3.510	16.340	0.000	19.850	0.000	0.000	0.000	0.000	0.000	0.000				2.240	22.090	0.014 Resv. by Colle.
4	Ozarkhed	60.320	19.420	41.680	0.000	61.100	3.199	0.250	0.000	0.000	3.449	1.270				8.270	72.819	4.25 Resv. by Colle.
5	Palkhed	21.240	79.620	167.150	4.930	251.700	23.100	4.952	0.000	0.000	28.052	19.380				8.100	287.852	22.85 Resv. by Colle.
6	Sanctioned Kharif Util on Reservoir and River over and above Project planning		19.810															
7	Tisgaon	12.760	3.440	6.120	0.000	9.560	0.920	0.000	0.000	0.000	0.920					3.200	13.680	0.71Resv. by Colle.
8	Sanctioned **Kharif** Util on Reservoir and River over and above Project planning		0.640															
	Total F	**334.820**	**141.560**	**263.310**	**4.930**	**389.350**	**27.219**	**6.307**	**0.000**	**0.000**	**33.526**	**20.650**	**0.000**	**0.000**	**0.000**	**45.880**	**468.756**	
G	**U/s of Jayakwadi**																	
	Bramhgavhan LIS II					85.000												
	Tembhapuri	19.610	3.460	12.750	0.000	16.210	0.560	1.910	0.000	0.000	2.470	0.560	1.250	1.760	2.350	5.360	24.040	0.000
	Dheku	12.170	1.340	8.420	0.000	9.760	0.350	0.000	0.000	0.000	0.350	0.000	1.245	1.742	0.783	3.770	13.880	0.000
	Kolhi	3.240	0.990	1.103	0.318	2.411	0.544	0.000	0.000	0.000	0.544	0.000	0.247	0.767	0.653	1.667	4.622	0.000
	Narangi	11.500	0.134	2.280	0.000	2.414	3.710	1.590	0.000	0.000	5.300	5.300	1.086	2.600	1.900	5.586	13.300	0.000
	Bor Dahegaon	11.470	2.073	7.380	0.000	9.453	0.232	0.000	0.000	0.000	0.232	0.000	1.603	2.800	1.008	5.411	15.096	0.000
	Ambadi	9.420	7.130	2.780	0.000	9.910	1.820	0.000	0.000	0.000	1.820	0.000	0.827	1.069	0.954	2.850	14.580	0.000
	Shivana Takli	37.060	1.734	31.732	0.000	33.466	3.791	0.000	0.000	0.000	3.791	3.791	2.130	3.550	1.288	6.968	44.225	0.000
	Total G	**104.470**	**16.861**	**66.445**	**0.318**	**168.624**	**11.007**	**3.500**	**0.000**	**0.000**	**14.507**	**9.651**	**8.388**	**14.288**	**8.936**	**31.612**	**129.743**	

Sr.No	Name of Dam/ System	Live Storage excluding Silt (As per Survey)	Planned Irrigation use				Annual non- Irrigation demands (Sanctioned)						Design Evaporation Losses					Contingency Rural Domestic Requirment
			Kharif	Rabi	HW	Annual	Domestic use	Industrial use	Hydro power	Mandatory demand (if any)	Total NI	NI provision in Project Report	Kharif	Rabi	H W	Annual	Total Annual Water Use	
1	2	3	4	5	6	7	8	9	10	11	11A	11B	12	13	14	15	15A	16
i	Paithan DAM																	
	Jaykawdi Project	1867.000	247.650	895.730	250.500	1393.880	283.200	160.750	0.000	0.000	443.950	0.000	224.050	150.780	290.000	664.830	2058.710	0.000
	Feeding to Majalgaon	0.000	287.000	148.508	124.492	560.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	560.000	0.000
	Total H	1867.000	534.650	1044.238	374.992	1953.880	283.200	160.750	0.000	0.000	443.950	0.000	224.050	150.780	290.000	664.830	2618.710	0.000
	Grand Total	1867.000	534.650	1044.238	374.992	1953.880	283.200	160.750	0.000	0.000	443.950	0.000	224.050	150.780	290.000	664.830	2618.710	0.000

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Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
	A) Mula System							
A)	**Domestic Use :**							
1	Mula	Ahmednagar	Ahmednagar	500000	40.578	Reservior		26.080
2	Mula	M. I. D.C. Ahmednagar	Ahmednagar & 7 Villages	100000	17.390	Reservior		7.160
3	Mula	Mahatma Phule Krishi Vidyapeeth, Rahuri	Rahuri	8500	1.090	Canal		0.360
4	Mula	Wambori	Wambori	17000	0.420	Canal		0.390
5	Mula	Sade Pimpri	Sade Pimpri - 2	5000	0.085	Canal		0.070
6	Mula	Rahuri	Rahuri	35000	7.530	Reservior		2.860
7	Mula	Deolali Pravara	Deolali Pravara	30000	2.370	Reservior		1.090
8	Mula	Rahuri Sugar Factory	Rahuri	10000	0.900	Canal		0.500
9	Mula	Baragaon Nandur Regional	Baragaon Nandur & 14 Villages	55000	4.470	Reservior		1.320
10	Mula	Sonai	Sonai	20000	0.510	Canal		0.380
11	Mula	Shani Shingnapur	Shani Shingnapur	2000	0.440	Canal		0.060
12	Mula	Bhenda Kukana	Bhenda, Kukana - 6 Villages	33000	1.680	Canal		0.440
13	Mula	Umbre	Umbre	5500	0.765	Canal		0.000
14	Mula	Miri Regional	Miri & 23 Villages	45000	1.614	Reservior		0.270
15	Mula	Brahmani	Brahmani	7500	0.099	Reservior		0.000
16	Mula	Mokal Ohol	Mokal Ohal	1000	0.014	Reservior		0.000
17	Mula	Musalwadi Regional	Musalwadi & 9 Villages	15000	1.096	Canal		1.280
18	Mula	Burhannagar Regional	Burhan Nagar & 7 Villages	60000	6.070	Reservior		0.400
19	Mula	Kuranwadi Regional	Kuranwadi & 19 Villages	25000	1.040	Reservior		0.440

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
20	Mula	Bhalwani Regional	Bhalwani & 13 Villages	45000	1.330	Reservior		0.000
21	Mula	Wasunde Regional	Wasunde & 5 Villages	15000	0.400	Reservior		0.000
22	Mula	Ranjangaon Devi Regional	Ranjangaon & 4 Villages	15000	0.450	Reservior		0.000
23	Mula	Chanda Regional	Chanda & 5 Villages	30000	0.840	Canal		0.000
24	Mula	Deogaon	Deogaon	8000	1.010	Canal		0.000
25	Mula	KhedleParmanand Regional	KhedleParmanand& 13 Villages	3000	1.210	Reservior		
26	Mula	Sonai Karajgaon Regional	Sonai & 16 Villages	35000	1.870	Reservior		0.000
27	Mula	Emergency				Canal		0.680
		I) Total of Domestic			95.270			**43.780**
		a) Reservoir			86.435		0.000	39.620
		b) Canal			8.835		17.680	4.160
B)	**Industrial Use :**							
1	Mula	Dnyaneshwar Sugar Factory			0.450	Canal		0.400
2	Mula	Mula Sugar Factory			2.120	Canal		0.160
3	Mula	Vruddheshwar Sugar Factory			0.360	Canal		0.080
4	Mula	M. I. D. C. Ahmednagar			5.800	Reservior		2.400
5	Mula	Dnyaneshwar Distilery			0.290	Canal		0.000
6	Mula	Rahuri Sugar Factory			0.990	Canal		0.410
7	Mula	Rahuri Paper Mill			3.020	Reservior		0.000
8	Mula	Vadala Cement Factory			0.010	Canal		0.000
9	Mula	Paper Mill Sonai			1.640	Canal		0.000
10	Mula	Dnyaneshwar Co - Elec.			0.410	Canal		0.040
		II) Total of Industrial			**15.090**		**12.540**	**3.490**

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
		a) Reservoir			**8.820**		**0.000**	**2.400**
		b) Canal			**6.270**		**12.540**	**1.090**
		Total (I+II)						
		a) Reservoir			**95.255**			**42.020**
		b) Canal			**15.105**			**5.250**
		Total of Non-Irrigation For Mula System			**110.360**		**12.540**	**47.270**
	B) Pravara System							
A)	**Domestic Use :**							
		Akole Taluka						
1	Bhandardara		Akole-1	15290	0.220	River		0.198
2	Bhandardara	Akole Extended	Akole Extended		0.943	River		
3	Bhandardara	Grampanchayat Rajur	Rajur-1	16000	0.220	River		0.166
4	Bhandardara	Rajur Supplimentery	Rajur Supplimentery		0.185	River		
5	Bhandardara	Kendrashala, Kalas	Kalas-1	500	0.060	River		0.000
6	Bhandardara	Grampanchayat Kalas Bk.	Kalas Bk-1	3641	0.063	River		0.056
7	Bhandardara	Shendi Pimpalachi Wadi	Shendi-2	1841	0.007	River		0.012
8	Bhandardara	Murshet	Murshet-1	5540	0.018	Reservoir		0.000
9	Bhandardara	Lohgaon	Lohgaon	7446	0.130	River		0.000
10	Bhandardara	Murshet, Panjare, Uddavane	Murshet-3	5540	0.060	River		0.000
11	Bhandardara	Mutkhel	Mutkhel-1	1163	0.035	Reservoir		0.000
12	Bhandardara	Unchkhadak Kd.	Unchkhadak Kd.	1191	0.084	River		0.075
13	Bhandardara	Kohandi	Kohandi-1	1178	0.028	River		0.025
14	Bhandardara	Titavi Ladgaon	Titavi-2	3883	0.120	River		0.000
15	Bhandardara	Guhire, Ranad, Telangan	Guhire	2678	0.109	River		0.000
16	Bhandardara	Chichondi, Bondarwadi	Chichondi-2	3362	0.088	Reservoir		0.292
17	Bhandardara	Waki, Manhere	Waki-2	3463	0.214	River		0.000
18	Bhandardara	Chitalwedhe	Chitalwedhe-1	968	0.030	River		0.027
19	Bhandardara	Lavhalwadi, Hinganwadi	Lavhalwadi-2	717	0.017	Reservoir		0.012
20	Bhandardara	Ratanwadi	Ratanwadi-1	1410	0.024	River		0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
21	Bhandardara	Katalapur & 2 Villages	Katalapur & 2 Villages	4982	0.159	River		0.000
22	Bhandardara	Bori & 2 Villages	Bori & 2 Villages	5100	0.159	River		0.000
23	Bhandardara	Pimparkane & 4 Villages	Pimparkane & 4 Villages	2395	0.200	River		0.000
24	Bhandardara	Gardani Khanapur	Gardani Khanapur	2688	0.144	River		0.000
25	Bhandardara	Unchkhadak Bk, Aurangpur	Unchkhadak Bk-2	1600	0.078	River		0.075
26	Bhandardara	Washere, Parkhatpur	Washere, Parkhatpur	2721	0.107	River		0.000
27	Bhandardara	Digambar	Digambar	8534	0.149	River		0.000
28	Bhandardara	Rumbhodi	Rumbhodi	3014	0.006	River		0.000
29	Bhandardara	Dhamangaon Awari	Dhamangaon Awari	6082	0.149	River		0.000
30	Bhandardara	Takali	Takali	3608	0.063	River		0.000
31	Bhandardara	Kalas Kd.	Kalas Kd.	3641	0.069	River		0.056
32	Bhandardara	Jamgaon	Jamgaon	1661	0.029	River		0.000
33	Bhandardara	Nimbral	Nimbral	1877	0.060	River		0.054
34	Bhandardara	Sangavi	Sangavi	1500	0.043	River		0.056
35	Bhandardara	Dhumalwadi	Dhumalwadi	4129	0.072	River		0.072
36	Bhandardara	Nilwande	Nilwande	500	0.096	River		0.000
37	Bhandardara	Adiwasi Unnati Seva Mandal, Rajur	Adiwasi Unnati Seva Mandal, Rajur	573	0.010	River		0.000
38	Bhandardara	Padalane	Padalane			River		0.046
39	Bhandardara	Somalwadi, Kohane	Somalwadi, Kohane			River		0.049
40	Bhandardara	Navalewadi	Navalewadi			River		0.035
		Total Akole Taluka		**130416**	**4.248**			**1.486**
		Sangamner Taluka						
41	Bhandardara	Jorve	Jorve	6503	0.020	River		0.136
42	Bhandardara	Jorve Supplimentery	Jorve Supplimentery		0.167	River		
43	Bhandardara	Pimparkane	Pimparkane	2806	0.049	River		0.027

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
44	Bhandardara	Sangamner City	Sangamner City	54000	1.650	River		1.851
45	Bhandardara	Sangamner Extended	Sangamner Extended		5.400	River		
46	Bhandardara	Chandanapuri, Zole	Chandanapuri, Zole	8710	0.300	Canal		0.067
47	Bhandardara	Vadgaon Pan	Vadgaon Pan	7755	0.089	River		0.000
48	Bhandardara	Dhandarfal Kd, Javale Kadlag	Dhandarfal Kd, Javale Kadlag	9864	0.360	River		0.356
49	Bhandardara	Nimgaon Paga & 7 Villages	Nimgaon Paga & 7 Villages	19538	0.748	River		0.000
50	Bhandardara	Talegaon Dighe & 15 Villages	Talegaon Dighe & 15 Villages	46860	2.073	River		2.072
51	Bhandardara	Samnapur	Samnapur	5498	0.096	River		0.105
52	Bhandardara	Nimaj & 3 Villages	Nimaj & 3 Villages	28751	0.502	River		0.244
53	Bhandardara	Chikhali, Mangalapur	Chikhali, Mangalapur	13574	0.237	River		0.234
54	Bhandardara	Vadgaon Landaga & Pimpalgaon Konzira	Vadgaon Landaga & Pimpalgaon Konzira	15269	0.267	River		0.000
55	Bhandardara	Chinchpur & 6 Villages	Chinchpur & 6 Villages	31959	0.558	Canal		0.000
56	Bhandardara	Panodi & 9 Villages	Panodi & 9 Villages	36931	1.050	Canal		0.308
57	Bhandardara	Karhe & other Villages	Karhe & other Villages	23425	0.409	River		0.000
58	Bhandardara	Kuran & 3 Villages	Kuran & 3 Villages	23425	0.409	River		0.000
59	Bhandardara	Umbari Balapur	Umbari Balapur	3022	0.090	Canal		0.090
60	Bhandardara	Kokangaon & 4 Villages	Kokangaon & 4 Villages	39003	0.681	River		0.000
61	Bhandardara	Ashwi Bk	Ashwi Bk	8742	0.253	River		0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
62	Bhandardara	Ashwi Kd	Ashwi Kd	6485	0.197	Canal		0.000
63	Bhandardara	Nilwande	Nilwande	3409	0.096	River		0.000
64	Bhandardara	Gunjalwadi	Gunjalwadi	9844	0.176	River		0.132
65	Bhandardara	Devgaon	Devgaon	3814	0.067	River		0.000
66	Bhandardara	Sangavi	Sangavi	2434	0.043	River		0.014
67	Bhandardara	Velhale, Saykhindi	Velhale, Saykhindi	14548	0.254	River		0.000
68	Bhandardara	Mathurabai Thorat Trust, Ghulewadi	Ghulewadi	26613	0.084	River		0.057
69	Bhandardara	Amrutvahini sheti v vikas sanstha, Ghulewadi	Amrutvahini sheti v vikas sanstha, Ghulewadi			River		**0.378**
70	Bhandardara	Savargaon Tal	Savargaon Tal	8133	0.142	River		0.000
71	Bhandardara	Kolhewadi	Kolhewadi			River		**0.072**
72	Bhandardara	Javale Kadlag	Javale Kadlag			River		**0.072**
73	Bhandardara	Khandgaon	Khandgaon			River		**0.041**
74	Bhandardara	Ghulewadi	Ghulewadi			River		**0.125**
75	Bhandardara	Zolekar	Zolekar			River		**0.067**
76	Bhandardara	Hivargaon Pavsa	Hivargaon Pavsa			River		**0.067**
77	Bhandardara	Waghapur	Waghapur			River		**0.018**
78	Bhandardara	Kharadi	Kharadi			River		**0.014**
79	Bhandardara	Rajapur	Rajapur			River		**0.031**
80	Bhandardara	Durgapur	Durgapur			River		**0.034**
81	Bhandardara	Rayatewadi	Rayatewadi			River		**0.026**
82	Bhandardara	Rayate	Rayate			River		**0.017**
83	Bhandardara	Sukewadi	Sukewadi			River		**0.010**
84	Bhandardara	Dadh Bk.	Dadh Bk.	9390	0.293	Canal		**0.146**
		Total Sangamner Taluka		**470305**	**16.759**			**6.811**
		Shrirampur Taluka						

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
85	Bhandardara	Shrirampur Nagarpalika	Shrirampur Nagarpalika	90000	7.180	Canal		6.084
86	Bhandardara	Belapur	Belapur	7852	0.400	Canal		0.778
87	Bhandardara	Belapur Bk.	Belapur Bk.	7960	0.144	Canal		
88	Bhandardara	Kolhar Bk.	Kolhar Bk.	9164	0.160	Canal		0.545
89	Bhandardara	Kolhar Bhagwatipur	Kolhar Bhagwatipur	20306	0.820	Canal		
90	Bhandardara	Haregaon	Haregaon	8098	0.210	Canal		0.009
91	Bhandardara	Haregaon Extended	Haregaon Extended	4868	0.085	Canal		
92	Bhandardara	Kadit, Fatyabad, Kuranpur, Galnimb, Mandave	Kadit & 4 Villages	14042	0.125	Canal		0.350
93	Bhandardara	Undirgaon, Malewadi	Undirgaon, Malewadi	12403	0.382	Canal		0.000
94	Bhandardara	Enakpur	Enakpur	28522	0.498	Canal		0.000
95	Bhandardara	Shirasgaon	Shirasgaon	4478	0.263	Canal		0.151
96	Bhandardara	Tisgaon	Tisgaon	7560	0.132	Canal		0.000
97	Bhandardara	Nandur Kd, & Bk.	Nandur Kd, & Bk.	11168	0.195	Canal		0.025
98	Bhandardara	Ukkalgaon	Ukkalgaon	4905	0.239	Canal		0.019
99	Bhandardara	Nipani Wadgaon	Nipani Wadgaon	13447	0.409	Canal		0.460
100	Bhandardara	Nimgaon Khairi	Nimgaon Khairi	5422	0.302	Canal		0.140
101	Bhandardara	Adgaon & Pimpari Lauki	Adgaon & Pimpari Lauki	7000	0.257	Canal		0.440
102	Bhandardara	Malwadgaon, Muthegaon	Malwadgaon, Muthegaon	3481	0.562	Canal		0.157
103	Bhandardara	Bherdapur, Karegaon	Bherdapur, Karegaon	32360	0.565	Canal		0.302
104	Bhandardara	Wangi, Khirdi, Gujarwadi	Wangi, Khirdi, Gujarwadi	14548	0.254	Canal		0.089
105	Bhandardara	Kamalpur, Ghumandev	Kamalpur, Ghumandev	2474	0.117	Canal		0.144

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
106	Bhandardara	Padhegaon, Kanhegaon	Padhegaon, Kanhegaon	8386	0.955	Canal		0.201
107	Bhandardara	Sarla, Govardhanpur	Sarla, Govardhanpur	6472	0.113	Canal		0.000
108	Bhandardara	Pimpri Nirmal	Pimpri Nirmal	5466	0.168	Canal		0.067
109	Bhandardara	Umbargaon	Umbargaon	6644	0.116	Canal		0.082
110	Bhandardara	Rajuri Supplementery	Rajuri Supplementery	15349	0.268	Canal		0.022
111	Bhandardara	Vadala Mahadev	Vadala Mahadev	10195	0.178	Canal		0.166
112	Bhandardara	Khokar	Khokar	10767	0.188	Canal		0.028
113	Bhandardara	Lohgaon	Lohgaon	10674	0.447	Canal		0.013
114	Bhandardara	Belapur Kd.	Belapur Kd.	14777	0.258	Canal		0.257
115	Bhandardara	Ranjankhol	Ranjankhol			Canal		0.211
116	Bhandardara	Matapur	Matapur			Canal		0.024
117	Bhandardara	Takalibhan	Takalibhan			Canal		0.075
118	Bhandardara	Khirdi	Khirdi			Canal		0.048
119	Bhandardara	Ghumandev	Ghumandev			Canal		0.144
		Total Shrirampur Taluka		398788	15.990			11.025
		Rahata Taluka						
120	Bhandardara	Hanumantgaon	Hanumantgaon	13746	0.240	Canal		0.000
121	Bhandardara	Hasnapur, Chandrapur	Hasnapur, Chandrapur	5498	0.096	Canal		0.000
122	Bhandardara	Loni Bk.	Loni Bk.	16174	1.140	Canal		0.676
123	Bhandardara	Loni Bk. & Kd.	Loni Bk. & Kd.	30213	1.568	Canal		
124	Bhandardara	Babhaleshwar	Babhaleshwar	12190	0.120	Canal		0.085
125	Bhandardara	Pravara Public School, Pravaranagar	Pravara Public School, Pravaranagar		0.183	Canal		0.000
126	Bhandardara	Pravara Medical Trust	Pravara Medical Trust		0.566	Canal		0.583

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
127	Bhandardara	Pravara Gramin Sanstha	Pravara Gramin Sanstha			Canal		0.428
		Total Rahata Taluka		**77821.000**	**3.913**			**1.772**
		Newasa Taluka						
128	Bhandardara	Pachegaon	Pachegaon		0.000	Canal		0.058
129	Bhandardara	Belpimpalgaon	Belpimpalgaon		0.000	Canal		0.025
		Total Newasa Taluka			**0.000**			**0.083**
		Rahuri Taluka						
130	Bhandardara	Nimbhere, Kanadgaon, Tulapur	Nimbhere, Kanadgaon, Tulapur	6075	0.135	Canal		0.641
131	Bhandardara	Bodhgaon & 3 Villages	Bodhgaon & 3 Villages	12600	0.220	Canal		0.000
132	Bhandardara	Songaon, Satral, Dhanora	Songaon, Satral, Dhanora	11508	0.272	Canal		0.351
133	Bhandardara	Davangaon & 6 Villages	Davangaon & 6 Villages	9551	0.538	Canal		1.015
134	Bhandardara	Kolhar Kd. Chincholi	Kolhar Kd. Chincholi	14433	0.252	Canal		0.368
135	Bhandardara	Kolhar Kd,	Kolhar Kd,	9030	0.070	Canal		
136	Bhandardara	Kolhar, Chincholi	Kolhar, Chincholi	12027	0.210	Canal		
137	Bhandardara	Deolali Pravara	Deolali Pravara	17182	0.300	Canal		0.000
138	Bhandardara	Songaon, Satral, Dhanora	Songaon, Satral, Dhanora	17755	0.310	Canal		0.351
139	Bhandardara	Rampur	Rampur	13225	0.040	Canal		0.053
140	Bhandardara	Tambhere	Tambhere	4410	0.077	Canal		0.000
141	Bhandardara	Guha	Guha			Canal		0.535
142	Bhandardara	Kesapur	Kesapur			Canal		0.404
		Total Taluka		**127796**	2.424			3.718
		Grand Total of Domestic Use of Bhandardara		**1205126**	**42.304**			**[illegible]**

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
		a) Reservoir			**0.158**		**0.000**	**0.304**
		b) Canal			**24.8151**		**46.080**	**17.209**
		c) River			**18.3606**		**18.361**	**7.382**
B)	**Industrial Use :**	**Industrial Use :**						
1	Bhandardara	Agasti Sugar Factory	Agasti Sugar Factory		0.420	River		0.420
2	Bhandardara	Amrutsagar Doodh Vyavsayik Sangh	Amrutsagar Doodh Vyavsayik Sangh		0.007	River		0.007
3	Bhandardara	Sangamner Sugar Factory	Sangamner Sugar Factory		1.650	River		1.650
4	Bhandardara	Sangamner Paper Mill	Sangamner Paper Mill		4.110	River		4.110
5	Bhandardara	Sangamner Doodh Vyavsayik Sangh	Sangamner Doodh Vyavsayik Sangh		0.290	River		0.290
6	Bhandardara	Pravara Sugar Factory	Pravara Sugar Factory		2.060	Canal		2.060
7	Bhandardara	Pravara Paper Mill	Pravara Paper Mill		6.520	Canal		6.520
8	Bhandardara	Pravara Chemical Plant	Pravara Chemical Plant		0.350	Canal		0.350
9	Bhandardara	Shrirampur Doodh Dairy	Shrirampur Doodh Dairy		0.065	Canal		0.065
10	Bhandardara	Pravara Doodh Sangh, Babhaleshwar	Pravara Doodh Sangh, Babhaleshwar		0.040	Canal		0.040
11	Bhandardara	Tilaknagar Distillery	Tilaknagar Distillery		0.510	Canal		0.510
12	Bhandardara	Babhaleshwar 400 K.V	Babhaleshwar 400 K.V		0.070	Canal		0.070

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
13	Bhandardara	Shrirampur Cotton Mill	Shrirampur Cotton Mill		0.730	Canal		0.730
14	Bhandardara	Belapur Sugar Mill. Haregaon	Belapur Sugar Mill. Haregaon		0.420	Canal		0.420
15	Bhandardara	Ashok Sugar Factory	Ashok Sugar Factory		0.610	Canal		0.610
16	Bhandardara	Rahuri Sugar Factory	Rahuri Sugar Factory		1.280	Canal		1.280
17	Bhandardara	Pravara Power Pri. Ltd.	Pravara Power Pri. Ltd.		2.193	Canal		2.193
18	Bhandardara	Sangamner MIDC	Sangamner MIDC		0.039	River		0.039
19	Bhandardara	MIDC, Shrirampur	MIDC, Shrirampur		1.947	Canal		1.947
20	Bhandardara	Hotel Anandvan Resort, Shendi	Hotel Anandvan Resort, Shendi		0.036	Reservoir		0.036
21	Bhandardara	Hotel Yash Resort, Shendi	Hotel Yash Resort, Shendi		0.063	Reservoir		0.063
22	Bhandardara	MTDC, Bhandardara	MTDC, Bhandardara		0.017	Reservoir		0.017
		Grand Total of Industrial Use of Bhandardhara			**23.427**			**23.427**
		a) Reservoir			**0.116**		**0.000**	**0.116**
		b) Canal			**16.795**		**31.190**	**16.795**
		c) River			**6.516**		**6.516**	**6.516**
	Pravara System							
	Nilwande Dam							
	Domestic use	1) Akole Water supply scheme	Akole & 32 villages	140543	2.590	Reservoir	0.000	Under Constucrion
		2) Sangamner Water Supply Scheme	Sangamne Town only	117683	10.560	Reservoir	0.000	Under Constucrion
		Total of domestic use Nilwande		258226	**13.150**	**(Reservoir)**	0.000	

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
	Industrial Use :			0	0.000		0.000	0.000
		Total of Industrial use Nilwande Dam Total			**0.000**			
		Grand Total of Nilwande		**258226**	**13.150**		**0.000**	**0.000**
	Adhala system							
	Adhala Dam							
	Domestic Use :							
1		0		5150	0.315	Reservoir	0.000	
2		Ganore & 4 Villages		6700	1.030	Reservoir	0.000	1.115
3		Mengalwadi		200	1.735	Reservoir	0.000	1.735
4		Deothan		5000	0.244	Reservoir	0.000	0.000
		Total of domestic use Adhala		**17050**	**3.324**	**Reservoir**	**0.000**	**2.850**
	Industrial Use :			Nil		Nil	Nil	Nil
		Grand Total of Adhala Dam		**Total**	**3.324**	**Reservoir**		**2.850**
A)	**Domestic Use :**							
108	Kadwa	Vadiv Sinnar water Supply-1	Sinnar-1	65251	2.280	River	0.710	1.800
109	Kadwa	Panchale & 14 Village water Supply	Panchale-15	26431	1.930	Canal	0.570	0.030
110	Kadwa	Mittasagare water Supply	Mittasagare-11	22154	0.790	Canal	0.600	0.090
111	Kadwa	Belu & 2 Village water Supply	Belu -3	3550	0.200	Canal	0.050	Not yet started
112	Kadwa	Baragaon Pimpri water Supply	Baragaon-7	18580	1.100	River	0.520	Not yet started
113	Kadwa	Bharvir bu.& Bhandardarawadi water supply	Bharvir bu-2	7000	0.200	Reservoir	0.060	Not yet started
108	Kadwa	Vadiv Sinnar water Supply-II	Sinnar-	198300	11.500	River	1.150	Not yet started
		Total Domestic Use			**18.000**		**3.660**	
		a) Reservoir			0.200		0.060	
		b) Canal			2.920		1.220	
		c) River			14.880		2.380	
B)	**Industrial Use :**							

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
A)	**Domestic Use :**							
1	Gangpur System	Grampanchayat,Saikheda water sypply Ta.Niphad	Saikheda-1		0.140	River	0.050	0.100
2	Gangpur System	Grampanchayat,Chandori water sypply Ta.Niphad	Chandori -1		0.060	River	0.020	0.070
3	Gangpur System	Grampanchayat,Kothure water sypply Ta.Niphad	Kothure-1		0.060	River	0.020	0.000
4	Gangpur System	Grampanchayat,Saikheda water	Saikheda-1		0.140	River		0.050
5	Gangpur System	Grampanchayat,Chandori water sypply Ta.Niphad	Chandori -1		0.060	River		0.020
6	Gangpur System	Grampanchayat,Kothure water sypply Ta.Niphad	Kothure-1		0.060	River		0.020
7	Gangpur System	Grampanchayat,Kasabe Sukene water sypply Ta.Niphad	Kasabe Sukene-1		0.570	Canal		0.230
8	Gangpur System	Grampanchayat,Shingave water sypply Ta.Niphad	Shingave -1		0.060	River		0.020
9	Gangpur System	Grampanchayat,Ozarkhed water sypply Ta.Niphad	Ozarkhed-1		0.040	Reservoir		0.010
10	Gangpur System	Niphad sahalari sakhar karkhana	Niphad-1		0.430	Canal		0.150
11	Gangpur System	Satpur -Ambad Industril Area	Satpur-2		3.260	River		0.920
12	Gangpur System	Grampanchayat,Pipri Sayyad water sypply Ta.Niphad	Pipri Sayyad-1		0.600	Canal		0.210
13	Gangapur	M.I.D.C	Satpur		4.180	Reservoir		0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
14	Nashik M-corporapaion				57.880	Reservoir		4.360
	Total Gangapur				67.540			
	Kashypi Dam	Nashik M-corporapaion			**18.670**	Reservoir	**1.520**	
		Grand Total			**153.750**		**1.610**	**6.160**
		a) Reservoir			80.770		0	**4.370**
		b) Canal			1.600		3.2	**0.590**
		c) River			3.840		3.84	**1.200**
	Darana							
1	Darna System	Vaijapur Nagarparishad water	Vaijapur	150000	2.210	Canal		1.220
2	Darna System	Gautam public School	Rahata	2300	0.050	Canal		0.020
3	Darna System	Sinnar Nagarparishad water	Sinnar	65271	0.790	River		2.020
4	Darna System	Deolali Cantoment Broad,Deolali	Deolali	50000	2.830	River		2.550
5	Darna System	Godavari Sugar Millas,Sakharwari	Sakharwari	14000	0.200	Canal		0.210
6	Darna System	Shri Ganesh Sah.Sakhar Karkhana	Rahata	8625	0.270	Canal		0.000
7	Darna System	Rahata Nagarparishad	Rahata	32998	0.240	Canal		2.700
8	Darna System	Grampanchayat, Puntamba water sypply	Puntamba	14282	0.440	Canal		0.740
9	Darna System	Shaskiya Aswani ,Chitali	Chitali	0	0.040	Canal		0.000
10	Darna System	Saibaba Sanshthan,Shirdi Kankori & Pimpalwadi	Shirdi	7779	1.510	Canal		0.540
11	Darna System	Grampanchayat, Sakuri water sypply	Sakuri	9796	0.080	Canal		0.050
12	Darna System	Grampanchayat, Ekrupa water sypply	Ekrupa	5695	0.090	Canal		0.070

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
13	Darna System	Grampanchayat, Pohegaon water sypply	Pohegaon	9131	0.150	Canal		0.130
14	Darna System	Grampanchayat, Karaji water sypply	Karaji	3881	0.050	Canal		0.000
15	Darna System	Grampanchayat, Chitali savlivihir water sypply	Chitali	5103	0.150	Canal		0.250
16	Darna System	Grampanchayat, savlivihir water sypply	Savlivihir	6521	1.200	Canal		1.180
17	Darna System	Kopargaon NagarpAlika	Kopargaon	85000	5.960	Canal		4.340
18	Darna System	Grampanchayat, Ravande water sypply	Ravande	6500	0.090	Canal		0.090
19	Darna System	Grampanchayat,Rajangaon Kh. water sypply	Rajangaon Kh.	7649	0.100	Canal		0.070
20	Darna System	Grampanchayat,Manikham water sypply	Manikham		0.060	Reservoir		0.000
21	Darna System	Grampanchayat,Javalke & 6 Village water sypply	Javalke	4100	0.120	Canal		0.080
22	Darna System	Grampanchayat,Jalgaon water sypply	Jalgaon	3491	0.080	Canal		0.410
23	Darna System	Grampanchayat,Ghoti Kh. water sypply	Ghoti Kh.		0.040	Reservoir		0.280
24	Darna System	Grampanchayat Samnere water sypply	Samnere		0.010	Reservoir		0.000
25	Darna System	Grampanchayat, Nimgaon - kolhale water sypply	Nimgaon		0.087	Canal		0.000
26	Darna System	Grampanchayat Sudarit Khadki Walki water sypply	Khadki Walki	9028	0.295	Canal		0.210
27	Darna System	Grampanchayat,Nategaon water sypply	Nategaon	4300	0.033	Canal		0.020

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
28	Darna System	Grampanchayat,Purak Rui shingave water sypply	Purak Rui shingave	3111	0.120	Canal		0.000
29	Darna System	Grampanchayat,Padegaon water sypply	Padegaon		0.050	Canal		0.000
30	Darna System	Grampanchayat Khirdi Ganesh water sypply	Khirdi Ganesh		0.063	Canal		0.000
31	Darna System	Grampanchayat,Dhamani water sypply	Dhamani		0.420	Reservoir		0.000
32	Darna System	Grampanchayat,vadhiv Rajangaon Deshmukh water sypply	Rajangaon Deshmukh		0.640	Canal		0.000
33	Darna System	Grampanchayat,Laxminagar water sypply	Laxminagar		0.122	Reservoir		0.000
34	Darna System	Grampanchayat,Sudarit Purak Bhojade water sypply	Purak Bhojade	3900	0.145	Canal		0.090
35	Darna System	Rahata Pimpalas	Rahata		1.680	Canal		0.000
36	Darna System	Grampanchayat, Lasalgaon-Vinchur& 16 Village water sypply	Lasalgaon-Vinchur		1.680	Canal		0.280
37	Darna System	Shirdi Nagarpalika water sypply	Shirdi	4161	1.360	Canal		2.030
38	Darna System	Grampanchayat, Chandkasare & Ghari water sypply	Chandkasare & Ghari	5750	0.310	Canal		0.230
39	Darna System	Grampanchayat,wadgaon Baktarpuer water sypply	wadgaon Baktarpuer		0.175	Canal		0.000
40	Darna System	Grampanchayat,Kumbari Mahegaon water sypply	Kumbari Mahegaon		0.355	Canal		0.000
41	Darna System	Grampanchayat,Takli Bramangaon water sypply	Takli Bramangaon	9649	0.465	Canal		0.020

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
42	Darna System	Grampanchayat,Dharangaon & 4 Village water sypply	Dharangaon	3300	0.480	Canal		0.000
43	Darna System	Grampanchayat,vari Kanegaon water sypply	vari Kanegaon		0.225	Canal		0.000
44	Darna System	Grampanchayat,kolpewadi Suregaon water sypply	kolpewadi		0.793	Canal		0.000
45	Darna System	Grampanchayat,Malegaon Thardi water sypply	,Malegaon Thardi		0.110	Canal		0.000
46	Darna System	Grampanchayat,Madhi Kh.water sypply	Madhi Kh.	2921	0.085	Canal		0.080
47	Darna System	Grampanchayat, Dehde kolhale water sypply	Dehde		0.115	Canal		0.000
48	Darna System	Grampanchayat, kokamtham water sypply	kokamtham	10350	0.480	Canal		0.150
49	Darna System	Grampanchayat, Sangavi Bhusar water sypply	Sangavi Bhusar	2563	0.135	Canal		0.060
50	Darna System	Grampanchayat, Dahigaon Kolhale water sypply	Dahigaon Kolhale	2130	0.080	Canal		0.000
51	Darna System	Grampanchayat, Karwadi Majur water sypply	Karwadi Majur		0.255	Canal		0.000
52	Darna System	Grampanchayat, Astagaon water sypply	Astagaon	11403	0.250	Canal		0.260
53	Darna System	Grampanchayat, Sudarit kolhale walki water sypply	kolhale walki	5927	0.245	Canal		0.260
54	Darna System	Grampanchayat, Dhotre water sypply	Dhotre		0.060	Canal		0.000
55	Darna System	Grampanchayat, Dahegaon Bolka water sypply	Dahegaon Bolka	4200	0.189	Canal		0.080

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
56	Darna System	Grampanchayat, savastar water sypply	savastar		0.525	Canal		0.000
57	Darna System	Grampanchayat,Yashgaon water sypply	Yashgaon	4300	0.231	Canal		0.000
58	Darna System	Grampanchayat,ukalgaon water sypply	ukalgaon		0.103	Canal		0.000
59	Darna System	Grampanchayat,Kasli water sypply	Kasli		0.059	Canal		0.000
60	Darna System	Grampanchayat,Dauch Kh water sypply	Dauch Kh	4053	0.105	Canal		0.090
61	Darna System	Grampanchayat,Sonewadi water sypply	Sonewadi	5750	0.218	Canal		0.210
62	Darna System	Grampanchayat,Nadukhi Kh.water sypply	Nadukhi Kh		0.180	Canal		0.000
63	Darna System	Grampanchayat,Natupatilachi wadi water sypply	Natupatilachi wadi		0.082	Canal		0.000
64	Darna System	Grampanchayat,Bolki water sypply	Bolki		0.056	Canal		0.140
65	Darna System	Grampanchayat,Wakadi .water sypply	Wakadi	12407	0.480	Canal		0.290
66	Darna System	Grampanchayat,Gondegaon .water sypply	Gondegaon	4881	0.181	Canal		5.230
67	Darna System	Garison Enginner South,deolali	Deolali	35000	4.980	Reservoir		2.170
68	Darna System	Garison Enginner Airforce ,deolali	Deolali	3500	1.330	Reservoir		0.020
69	Darna System	Puntamba Railway Station	Puntamba		0.055	Canal		0.000
70	Darna System	Garison Enginner North,deolali	Deolali		4.480	River		0.000
71	Darna System	NAshik Thermal powar Station	Eklahara		0.657	River		0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
72	Darna System	Grampanchayat,Mauje Pimpalas (Ramache) Tal.Niphad	Mauje Pimpalas	7475	0.268	River		0.000
73	Darna System	Grampanchayat,Kokamthan water supply Dist.Ahemdnagar	Kokamthan		0.350	Canal		0.000
74	Darna System	Grampanchayat,Singanapur water supply Tal.Kopargaon	Singanapur	10860	0.088	Canal		0.000
75	Darna System	Sanjiwani Sakhar Karkhana sadanandnagar Tal.Kopargaon	Kopargaon		0.124	River		0.050
76	Darna System	Nashik Muncipal Corporation	Nashik		11.490	River		8.510
	Total Darana				**54.304**			
77	Gautami Godavari	Yogvidya Gurukul Talwade water Supply	Talwade		0.010	Reservoir		0.010
78	Gautami Godavari	Gajanan Maharaj Sanshthan water Supply	Trimbakeshwar		0.020	Reservoir		0.010
79	Gautami Godavari	Shri Swami Samarth Gurupith water Supply	Trimbakeshwar		0.030	Reservoir		0.000
80	Gautami Godavari	Nashik muncipal corporation	Nashik		20.750	Reservoir		0.000
	Total Gautami Godavari				**20.810**			
81	Mukane	Niphad Kundewadi water Supply	Niphad		0.600	River		0.220
82	Mukane	Naigaon va 9 village water Supply	Naigaon	25250	0.760	River		0.380
83	Mukane	Kavnai water Supply	Kavnai	3500	0.090	Reservoir		0.090
84	Mukane	Bhagur water Supply	Bhagur	12336	0.430	River		0.260
85	Mukane	Sanjegaon water Supply	Sanjegaon	3100	0.082	Reservoir		0.070
86	Mukane	Gonde Dumala water Supply	Gonde	3800	0.120	Reservoir		0.090
87	Mukane	Parle Biscuit p.Ltd.Gondhe	Gonde		0.060	Reservoir		0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
88	Mukane	Nashik muncipal corporation	Nashik	1500000	17.540	Reservoir		0.000
	Total Mukane				**19.682**			
89	Waldevi	Vadivahre water Supply	Vadivahre-1	12000	0.120	Reservoir		0.050
90	Bojapur	Manegaon water supply	Manegaon	53000	1.420	Reservoir		1.510
91	Bojapur	Kankori & 11 Village water Supply	Kankori	20000	0.870	Reservoir		0.780
	Total Bojapur				**2.290**			
92	Daraswadi	Ganur & 2 Village water Supply	Ganur		0.260	Reservoir		0.000
93	Daraswadi	Urdhal water Supply	Urdhal		0.130	Reservoir		0.000
	Total Daraswadi				**0.390**			
		a) Reservoir			48.464		0.000	5.080
		b) Canal			26.703		49.590	21.830
		c) River			22.429		22.429	13.990
B)	**Industrial Use :**							
1	Darna	Nashik Sugar sarkana ltd.	Palse	600	0.430	River		0.030
2	Darna	Kopargaon sahakari sakhar karkhana.	Kopargaon		0.400	Canal		0.090
3	Darna	Changdev Nagar Sugar Mills	Kopargaon		0.120	Canal		0.000
4	Darna	Ganesh sahakari sakhar karkhana.	Rahata		0.370	Canal		0.350
5	Darna	Aashkiya Aswani Chitali	Chitali		0.830	Canal		0.000
6	Darna	Sanjivani Nagar Sugar Karkhana	Sahajanand nagar		1.440	Canal		0.920
7	Darna	Somaiya Chemical	Kopargaon		0.390	Canal		0.890
8	Darna	Kopargaon sahakari sakhar karkhana. (Distillary)	Kopargaon		1.340	Canal		0.820

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
9	Darna	Kopargaon sahakari sakhar karkhana. (boigas)	Kopargaon		0.890	Canal		0.630
10	Darna	India Exotics icecream p ltd malunje	Malunje		0.015	Reservoir		0.010
11	Darna	Shridi (Kakdi) Airport Devlopment	Shrirdi		0.913	Canal		0.000
	Total Darna				**7.137**			
12	Mukane	Jidal Photo	Mudhegaon		0.708	Reservoir		0.340
13	Mukane	salora shivsang textiles	Mudhegaon		0.062	Reservoir		0.000
14	Mukane	E.B.G.india ltd (Thisenkrupa)	Gonde dumala		0.720	Reservoir		0.160
15	Mukane	Parle Biscuit p.Ltd.Gondhe	Gonde dumala		0.010	Reservoir		0.070
16	Mukane	Ashoka Industrial park p ltd.gonde	Gonde dumala		1.095	Reservoir		0.090
	Total Mukane				**2.595**			
17	Gangapur	Maharashtra Eng.Re.institute Meri Nashik	Nashik		6.800	Canal		0.000
18	Gangapur	MIDC,Satpur	Satpur		7.330	River		7.870
19	Gangapur	Nashil Thermal powar station	Eklahara		33.980	River		19.610
20	Gangapur	Niphad Sahkari sakhar karkhana	Niphad		0.710	Canal		0.290
21	Gangapur	C & M Farming p Ltd.	Nashik		0.220	River		0.000
22	Gangapur	Soma paper mills & Industries	Panchak		0.020	River		0.000
23	Godawari Dam	Mahajanco,Mumbai ,Nashik Thermal powar Station (1*660 wt unit)	Eklahara		6.500	River		0.000
	Total Gangapur				**55.560**			
24	Alandi	Spectram E Ltd.Rasegaon	Rasegaon-1		0.063	Reservoir		0.030
25	Waldevi	Sinnar Industrial Area	Sinnar	5500	12.180	River		3.740
26	Waldevi	Vinche industrial Area	Vinchur			Reservoir		0.060

Annexure -4

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Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
		a) Reservoir			2.673		0.000	0.760
		b) Canal			14.203		26.377	3.990
		c) River			60.660		60.660	31.250
	Palkhed System							
A)	**Domestic Use :**	1) Defence water supply scheme, Sakore Tal.Niphad Dist.Nashik	Sakore	11000	5.100	Canal		14.540
	Palkhed System	2) Ozar, Sakore Tal.Niphad Mohadi, Janori Tal.Dindori Regional water supply scheme	4	73000	2.360	Reservoir		3.750
	Palkhed System	3) Palkhed & five villages Tal.Dindori Regional water supply scheme	6	22000	0.760	Reservoir		0.000
	Palkhed System	4) Grampanchayat Pimpalgaon (B) water supply scheme Tal.Niphad Dist.Nashik	1	70000	0.920	Reservoir		1.070
	Palkhed System	5) Grampanchayat Lasalgaon water supply scheme Tal.Niphad Dist.Nashik	1	17000	0.690	Canal		2.050
	Palkhed System	6) Grampanchayat Vinchur water supply scheme Tal.Niphad Dist.Nashik	1	20000	0.120	Canal		1.370
	Palkhed System	7) Grampanchayat Ambegaon water supply scheme Tal.Yeola Dist.Nashik	1	1500	0.060	Canal		0.660
	Palkhed System	8) Nagar Parishad Manmad water supply scheme Tal.Nandgaon Dist.Nashik	1	50000	5.959	Canal		15.930

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Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
	Palkhed System	9) Nagar Parishad Yeola water supply scheme Tal.Yeola Dist.Nashik	1	51000	2.290	Canal		19.720
	Palkhed System	10) 36 villages in Yeola Taluka water supply scheme Tal.Yeola Dist.Nashik	36	51000	4.317	Canal		6.890
	Palkhed System	11) Vani water supply scheme Kasabe Vani Tal.Didori Dist.Nashik	1	26000	0.524	Canal		0.530
	Total				**23.100**			
	Palkhed System	12) 36 villages in Chandwad Taluka water supply scheme Tal.Chandwad Dist.Nashik	36	40000	2.680	Reservoir		1.850
	Palkhed System	14) Grampanchayat Dindori water supply scheme Tal.Dindori Dist.Nashik	1	26000	0.519	Reservoir		0.080
	Total Ozarkhed				**3.199**			
	Palkhed System	13) Bopegaon & six villages Tal.Dindori Regional water supply scheme	7	6000	0.800	Reservoir		0.350
	Palkhed System	14) Grampanchayat Khedgaon water supply scheme Tal.Dindori Dist.Nashik	1	6000	0.120	Reservoir		0.080
	Total Tisgaon				**0.920**			
		a) Reservoir			8.159		0.000	7.180
		b) Canal			19.060		38.120	61.690
		c) River			0.000		0.000	0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
B)	**Industrial Use :**	1) Seegram Distillaries Pvt. Ltd. Kadwa Mhalungi Tal.Dindori Dist.Nashik			0.655	Reservoir		0.210
	Palkhed System	2) C & M Group pharming Pvt. Ltd. Vani Joran Tal.Dindori Dist.Nashik			0.450	Reservoir		0.170
	Total Karanjvan				**1.105**			
	Palkhed System	3) Mcdowells & company Ltd. Parmori Tal.Dindori Dist.Nashik			0.060	Reservoir		0.062
	Palkhed System	4) Kadwa Sahakari Sakhar Karkhana Ltd. Rajaram Nagar (Materewadi) Tal. Dindori Dist.Nashik			0.170	Reservoir		0.110
	Palkhed System	5) Ashok Kumar Hatchries Ltd. Lakhamapur Tal. Dindori Dist.Nashik			0.017	Reservoir		0.038
	Palkhed System	6) Dindori small scale Industrial colony Plashed Bandhara Tal. Dindori Dist.Nashik			0.110	Reservoir		0.115
	Palkhed System	7) Central Railway, Manmad Tal.Nandgaon Dist.Nashik		30000	1.980	Canal		1.460
	Palkhed System	8) Karmaveer Kakasaheb Wagh Sahakari Sakhar Karkhana Ltd.Kakasaheb Nagar Ranwad Tal.Niphad Dist.Nashik			0.215	Canal		0.039

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
	Palkhed System	9) Executive Engineer, M.I.D.C. Additional Dindori Industrial Area (Mauje Talegaon Akrale) Tal. Dindori Dist.Nashik			2.400	Reservoir		0.000
	Total Palkhed				**4.952**			
	Palkhed System	10) Polygenta Pvt. Ltd.Aavankhed Tal.Dindori Dist.Nashik			0.055	Reservoir		0.240
	Palkhed System	11) Everest Industries Pvt. Ltd. Lakhamapur Tal.Dindori Dist.Nashik			0.186	Reservoir		0.240
	Palkhed System	12) Godavari Pupples & paper Mills Pvt. Ltd. Lakhamapur Tal.Dindori Dist.Nashik			0.007	Reservoir		0.056
	Total Ozarkhed				**0.248**			
		a) Reservoir			4.110		0.000	1.241
		b) Canal			2.195		4.400	1.499
		c) River			0.000		0.000	0.000
A)	**Domestic Use :**							
L)	**Jayakwadi System**							
	Jayakwadi dam							
	1	Aurangabad City W. S. Seheme O	1	1300000	113.276	Reservoir	0.000	55.470
	2	Katpur Village W. S. Seheme	1	5974	0.330	Reservoir	0.000	0.312
	3	Shevgaon-Pathrdi & 44 Villages V	46	105124	4.013	Reservoir	0.000	4.050
	4	Gangapur W. S. Seheme (Ext.)	1	22325	1.140	Reservoir	0.000	0.727
	5	Newasa Water Supply Seheme	1	24943	1.400	Reservoir	0.000	1.260
	6	Apegaon wadwali & 6 Villages W	8	9262	0.300	Reservoir	0.000	0.274

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
7		Paithan city, Kavsan & Narala W. S. Seheme (Add.Paithan)	3	34518	7.630	Reservoir	0.000	1.793
8		Pimpalwadi Pirachi W. S. Seheme	1	8423	0.551	Reservoir	0.000	0.164
9		Lohagaon & 12 Villages (R)W. S.	13	16900	0.320	Reservoir	0.000	0.329
11		M.I.D.C.Waluj W. S. Seheme	1	200000	11.450	Reservoir	0.000	5.640
12		M.I.D.C.Paithan Water Supply Se	1	4500	1.000	Reservoir	0.000	0.110
13		Manvat Water Supply Seheme	1	29218	1.670	Canal	8.350	0.000
14		Ghogargaon & 9 Villages W. S. S	10	13032	0.420	Reservoir	0.000	0.264
15		Jamgaon & 3 Villages (R) W. S.	4	7100	0.450	Reservoir	0.000	0.083
16		Galnib & 10 Villages W. S. Sehe	11	8715	1.780	Reservoir	0.000	0.000
17		Waluj Mahanagar W. S. Seheme	1	225545	110.000	Reservoir	0.000	0.000
18		Bodhegaon & 8 Villages W. S. S	9	14041	1.870	Reservoir	0.000	0.310
19		Prawara Sangam & 8 Villages W	9	8543	0.370	Reservoir	0.000	0.000
20		Hatgaon & 28 Villages W. S. Seh	29	18286	1.360	Reservoir	0.000	0.000
21		Shahar Takali & 24 Villages W. S	25	30000	1.380	Reservoir	0.000	0.000
22		Dhorkin, Balanagar W. S. Seheme	2	8738	0.510	Reservoir	0.000	0.000
23		Ghari & 7 Villages Regional W. S	8	4127	0.320	Reservoir	0.000	0.000
24		Jayakwadi & 2 Wadies Regional V	3	2500	0.040	Reservoir	0.000	0.000
25		Babargaon & 4 Villages Regional	5	9612	0.130	Reservoir	0.000	0.000
26		Gurudhanora& 10 Villages Regio	11	8480	0.320	Reservoir	0.000	0.000
27		Pakhora & 9 Villages Regional W	10	7232	0.500	Reservoir	0.000	0.000
28		Nevargaon & 12 Villages Regiona	13	12427	0.840	Reservoir	0.000	0.000
29		Mandva & 15 Villages Regional V	16	11334	0.450	Reservoir	0.000	0.000
30		Shekta & 9 Villages Regional W.	10	8427	0.400	Reservoir	0.000	0.000
31		Kaygaon W. S. scheme	1	4063	0.000	Reservoir	0.000	0.000
32		Jalna-Ambad- Georai Joint W. S.	3	290314	18.000	Canal	22.000	30.866
33		Talwada Rural Water Supply Seh	1	8586	0.285	Canal	1.425	0.000
34		Dhondrai & Umapur Joint W. S. S	2	13746	0.350	Canal	1.750	0.000
35		Chakalamba & 3 Villages W. S. S	4	7873	0.305	Canal	1.525	0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
	36	Borgaon & 2 Villages W. S. Sehe	3	2960	0.047	Canal	0.235	0.000
		Total Jayakwadi - domestic	**268**	**2486868**	**283.207**		**35.285**	**101.652**
		a) Reservoir			262.550		0.000	70.786
		b) Canal			20.657		35.285	30.866
B)	**Industrial Use :**							
L)	**Jayakwadi System**							
	Jayakwadi dam							
	1	MIDC Waluj	1	10500	34.350	Reservoir	0.000	10.001
	2	Eknath Sah.Sakhar Karkhana Paithan	1	120	1.200	Reservoir	0.000	0.103
	3	Nath Pulp & Paper Mills, Paithan	1	850	1.100	Reservoir	0.000	1.140
	4	MIDC Paithan	1	600	4.500	Reservoir	0.000	0.278
	5	Aurangabad Paper Mills, Paithan	1	..	1.100	Reservoir	0.000	0.000
	6	Kaigaon Paper Mills, Gangapur	1	95	0.540	Reservoir	0.000	0.000
	7	Ensy Faqgransi Pvt.Ltd, Dhakephal	1	..	0.073	Reservoir	0.000	0.000
	8	Devnandra Sah.Sakhar Karkhana, Pathri (Parbhani)	1		0.350	Canal	0.000	0.000
	9	Shivshakti Craft Board Mills Pvt.Ltd., Dhakephal	1	..	0.060	Reservoir	0.000	0.000
	10	Sharad Sah.Sakhar Karkhana, Vihamandva Paithan	1	..	0.140	Canal	0.000	0.000
	11	Yogeshwari Sugar Industries Ltd, Limba, Ta.Pathri	1	..	0.026	Reservoir	0.000	0.000
	12	Granautch Industries, Bhendala, Ta.Gangapur	1	300	0.142	Reservoir	0.000	0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
13		Pranav Industries, Surewadi Tq. Gangapur	1	65	0.511	Reservoir	0.000	0.000
14		Bharat Force Company, Vaijapur	1	..	40.000	Reservoir	0.000	0.000
15		Gangamai Industries & Construction, Babhalgaon, Ta.Shevgaon	1	..	0.016	Reservoir	0.000	0.000
16		Shendra Bidkin MIDC, Dist.Aurangabad	1	..	33.520	Reservoir	0.000	0.000
17		Kedareshwar Sah.Sakhar Karkhana Ltd, Ramnagar	1	..	1.107	Reservoir	0.000	0.000
18		Kokan- Agrow pvt. ltd	1	..	0.000	Reservoir	0.000	0.050
		Parali Thermal Unit	1	..	42.000	Canal	15.000	45.000
		Total jayakwadi- Indusrial	**19**	**12530**	**160.735**		**15.000**	**56.572**
		a) Reservoir			118.245		0.000	11.572
		b) Canal			42.490		15.000	45.000
	Total Jayakwadi	**Domestic**			**283.207**		**35.285**	**101.652**
		Industrial Use			**160.735**		**15.000**	**56.572**
		Grand Total			**443.942**		**50.285**	**158.224**
	Domestic Use :							
	Medium Projects							
a)	Tembhapuri	Godavari water supply scheme Dahegaon	1	1370	0.020	Reservoir	0.000	0.020
b)		Godavari water supply scheme Rahimpur	1	411	0.006	Reservoir	0.000	0.006
c)		Godavari water supply scheme Limbejalgaon	1	2055	0.030	Reservoir	0.000	0.030
d)		Godavari water supply scheme Turkabad	1	4794	0.070	Reservoir	0.000	0.070

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
	e)	Godavari water supply scheme Malkapur	1	274	0.004	Reservoir	0.000	0.004
	f)	Godavari water supply scheme Shirodi	1	685	0.010	Reservoir	0.000	0.010
	g)	Godavari water supply scheme Murmi	1	753	0.011	Reservoir	0.000	0.011
	h)	Godavari water supply scheme Jikthan	1	2397	0.035	Reservoir	0.000	0.035
	i)	Godavari water supply scheme Ambelohol	1	3699	0.054	Reservoir	0.000	0.054
	j)	Godavari W.S. scheme Ranjangaon (Khuri)	1	3014	0.044	Reservoir	0.000	0.044
	k)	Godavari water supply scheme Guru Dhanora	1	2397	0.035	Reservoir	0.000	0.035
2	Dheku	Pokhari & 3 villeges W.S. Scheme	4	3000	0.240	Reservoir	0.000	0.044
		Rawdi W. S. Scheme	1	1500	0.000	Reservoir	0.000	0.022
3	Kolhi	Shioor W. S. Scheme	1	25000	0.394	Reservoir	0.000	0.360
		Khandala W. S. Scheme	1	15000	0.150	Reservoir	0.000	0.216
4	Narangi	Vaijapur Muncipal Co. W. S. Scheme	1	55000	3.710	Reservoir	0.000	0.720
		Chandgaon ,Nandgaon, Rotegaon W.S. Scheme	3	4500	0.250	Reservoir	0.000	0.110
5	Bor Dahegaon	Lasur Station and other villages W. S. Scheme	3	22000	0.232	Reservoir	0.000	0.538
6	Ambadi	Kannad Nagar parished	1	45172	1.590	Reservoir	0.000	1.120
		Andhaner Grampanchyat	1	6534	0.230	Reservoir	0.000	0.160
7	Shivana Takli a)	1) Werul & 5 Villages	6	63287	0.924	Reservoir	0.000	0.924

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
	b)	2) Jalgaon Ghat & 4 Villages	5	30137	0.440	Reservoir	0.000	0.440
	c)	3) Shewats & 2 Villages	3	31438	0.459	Reservoir	0.000	0.459
	d)	4) Werul caves iind Stage	1	66027	0.964	Reservoir	0.000	0.964
	e)	5) Aurala & six villages	7	16643	0.243	Reservoir	0.000	0.243
	f)	6) Tisgaon & 8 Villages	9	22671	0.331	Reservoir	0.000	0.331
	g)	7) Loni & 4 Villages	5	14041	0.205	Reservoir	0.000	0.205
	h)	8) Kasabkheda & 3 Villages	4	15410	0.225	Reservoir	0.000	0.225
		Medium Project Total	**67**	**459209**	**10.906**		**0.000**	**7.400**
		a) Reservoir			10.906		0.000	7.400
		b) Canal			0.000		0.000	0.000

Annexure -4

Details of non-irrigation demands from Major and Medium projects in Upper Godavari (upto Paithan Dam) Sub-basin

Sr. No.	Name of Dam/system	Name of Scheme	Name of Towns and No. of villages	Total population	Annual water requirement (sanctioned) (Mcum)	Source of supply (Reservior / River /Canal ch. etc.)	Transit losses if any (Mcum)	Actual water supplied in 2011-12 (Mcum)
1	2	3	4	5	6	7	8	9
	Industrial Use :							
	Medium Projects							
1	Tembhapuri	Mukteshwar Shugar Mill Dhamori	1	..	1.910	Reservoir	0.000	2.000
2	Dheku	Nil	0	..	..	..	0.000	0.000
3	Kolhi	Nil	0	..	..	..	0.000	0.000
4	Narangi	M.I.D.C. vaijapur	1	..	1.510	Reservoir	0.000	0.000
5	Bor Dahegaon	Nil	0	..	..	..	0.000	0.000
6	Ambadi	Nil	0	0	0.000	0.000	0.000	0.000
7	Shivana Takli	Nil	0	..	..	..	0.000	0.000
		Total Medium Project		**0**	**3.420**		**0.000**	**2.000**
		Industrial Use Grand Total		**12530**	**324.889**		**30.000**	**103.572**

Supdt. Engr. Bnds. CE Aband

C.E. N.M.R.

EXECUTIVE DIRECTOR
Godavari Marathwada Irrigation Development Corporation, Aurangabad.

Annexure -5 (Command Area Developement Authority ,Nasik)

Information about Kharif utilizations from Major and Medium projects in Upper Godavari (upto Paithan dam) sub-basin

Sr. No.	Name of Dam/ System	Planned Kharif Use		Yearwise Kharif use (Irrigation)											
				2007-08		2008-09		2009-10		2010-11		2011-12		Average	
		Area (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)
1	2	3	4	15	16	17	18	19	20	21	22	23	24	25	26
A	**Mula System**														
1	Mandohal Medium Project	2266	4.310	241	0.470	0	0.000	0	0.000	123	0.590	0	0.000	72.8	0.210
2	Mula Dam	35556	168.440	15267	129.340	524	2.400	8226	76.840	0	0.000	990	39.190	5001.4	56.494
	(Through Canal Escape)				4.980		29.720								
	Total of Mula System	37822	172.750	15508	134.790	524.000	32.120	8226	76.840	123	0.590	990	39.190	5073.4	56.704
B	**Pravara System**														
1	Bhandardara	11186	117.800	9047	173.930	8513	146.200	13920	93.160	5012	96.700	6607	110.950	8620	124.190
2	Nilwande	64260	128.160	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
3	Adhala Dam	1774	13.190	200	3.220	0	2.970	159	2.310	159	1.780	190	2.050	142	3.470
4	Bhojapur Dam	2500	0.960	63	15.470	0	7.650	0	0.540	0	8.320	0	0.890	12.6	6.574
	Total of Pravara System	79720	260.110	9310	192.620	8513	156.820	14079	96.000	5171	106.800	6797	113.890	8774.6	134.234
C	**Gangapur System**														
1	Gautami Godavari Dam	0	13.900	0	1.018	0	0.244	0	0.220	0	0.749	0	0.798	0	0.606
2	Kashyapi Dam	0	7.670		1.303	0	0.153	0	0.270	0	0.727	0	0.727	0	0.636
3	Gangapur Dam	0	0.000	701	51.277	666	46.300	3015	63.760	3047	76.620	2878	72.380	2061.4	62.067
4	Alandi Dam	2266	9.910	0	0.990	0	0.840	0	0.000	0	0.450	0	0.820	0	0.620
	Total.of Gangapur System	2266	31.480	701	54.588	666	47.537	3015	64.250	3047	78.546	2878	74.725	2061.4	63.929
D	**Kadwa System**														
1	Upper Kadwa		2.950												
2	Kadwa Dam	5564	30.536	425	28.960	129	14.630	318	12.143	592	23.980	1452	29.310	583.2	21.805
	Total of Kadwa System	5564	33.486	425	28.960	129.000	14.630	318	12.143	592	23.980	1452	29.310	583.2	21.805
E	**Darna System**														
1	Bhawali Dam	1263	6.380	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
2	Darna Dam	3887	5.672	312	7.710	256	9.520	133	9.430	298	8.030	256	7.450	251	8.428
3	Mukane Dam	113	0.560	302	1.200	302	1.170	0	0.230	303	1.250	303	0.770	242	0.924
4	Waldevi Dam	740	6.970	33	0.110	33	41.670	0	0.000	102	0.350	103	1.180	54.2	8.562
5	N.M.Weir (Godavari canal) & Gangapur Project	7573	95.600	4406	145.552	4390	54.290	4256	88.595	973	111.587	5595	121.150	3924	104.235
6	N.M.Express Canal	10672	129.070		56.370		14.880		13.120		25.160	100	31.502	20	23.206
	Total of Darna System	24248	244.352	5053	210.942	4981	121.560	4389	111.375	1376	146.377	6357	162.052	4491.2	145.355
F	**Palkhed System**														
1	Karanjwan	567	2.810	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
2	Waghad	2430	12.310	0	0.000	323.2	1.470	577.6	1.010	629.73	1.137	179.25	2.633	341.956	1.250

Sr. No.	Name of Dam/ System	Planned Kharif Use		Yearwise Kharif use (Irrigation)											
				2007-08		2008-09		2009-10		2010-11		2011-12		Average	
		Area (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)
1	2	3	4	15	16	17	18	19	20	21	22	23	24	25	26
3	Punegaon	2514	3.510	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
4	Ozarkhed	3744	19.420	0	0.000	0	0.000	0	0.000	0	0.000	1485	10.264	297	2.053
5	Palkhed	22330	79.620	3386.4	65.000	578.3	67.710	4157.58	33.040	94.9	25.080	93.5	44.570	1662.136	47.080
7	Tisgaon	622	3.440	0	0.000	0	0.000	0	0.000	0	0.000	0	0.499	0	0.100
	Total Palkhed System	32207	121.110	3386.4	65.000	901.5	69.180	4763.18	33.040	94.9	25.080	1578.5	55.333	1959.136	49.233
G	U/s of Jayakwadi														
1	Tembhapuri	256	3.460	15	0.100	0	0.000	36	0.240	29	0.190	68	0.450	30	0.200
2	Dheku	1392	1.340	130	0.160	103	0.200	50	0.061	0	0.000	0	0.000	56.6	0.084
3	Kolhi	230	0.990	9	0.001	0	0.000	0	0.000	0	0.000	0	0.000	1.8	0.002
4	Narangi	200	0.134	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
5	Bor Dahegaon	320	2.073	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
6	Ambadi	1073	7.130	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
7	Shivana Takli	2284	1.734	0	0.000	0	0.000	0	0.000	0	0.000	936	3.700	936	3.700

Bors. C.E. Aurangabad.

C.E.
N.M.R.

EXECUTIVE DIRECTOR
Godavari Marathwada Irrigation
Development Corporation, Aurangabad.

Annexure -6

Information about Rabi utilizations from Major and Medium projects in Upper Godavari (upto Paithan dam) sub-basin

Sr. No.	Name of Dam/ System	Planned Rabi Use		Yearwise Rabi use (Irrigation)											
				2007-08		2008-09		2009-10		2010-11		2011-12		Average	
		Area (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	**Mula System**														
1	Mandohal Medium Project	1427.000	7.410	424	6.110	453	6.340	200	2.190	328	4.220	0	0.000	281	3.770
2	Mula	47698.000	400.600	25165	278.550	24629	270.810	19460	126.330	17221	122.850	36327	249.470	24560	209.602
	Total of Mula System	49125.000	408.010	25589	284.660	25082	277.150	19660	128.520	17549	127.070	36327	249.470	24841	213.372
B	**Pravara System**														
1	Bhandardara	15235.000	139.800	8699	135.450	7521	129.660	13574	137.500	9315	144.500	10396	190.650	9901	147.550
2	Nilwande	59900.000	197.860	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
3	Adhala Dam	3134.000	13.450	1166	13.630	1283	15.400	1276	13.620	729	10.100	1259	12.740	1143	13.100
4	Bhojapur Dam	2500.000	8.380	757	9.267	982	9.465	1110	8.809	609	6.032	0	3.400	692	7.395
	Total of Pravara System	80769.000	359.490	10622	158.347	9786	154.525	15960	159.929	10653	160.632	11655	206.790	11736	168.045
C	**Gangapur System**														
1	Gautami Godavari Dam	4831.092	30.400	86	0.364	140	1.080	208	1.016	266	1.080	284	2.178	197	1.144
2	Kashyapi Dam	1247.502	7.850	74	0.582	95	0.704	108	0.737	115	0.720	120	0.949	102	0.695
3	Gangapur Dam	12357.425	77.760	4526	32.463	4997	32.593	5590	16.209	5001	19.431	5468	40.721	5196	28.283
4	Alandi Dam	4030.000	27.910	1085	6.882	1075	10.203	985	7.690	866	6.334	1041	10.500	1010	8.322
	Total of Gangapur System	22466.019	143.920	6171	40.291	6307	44.580	6891	25.652	6248	27.565	6913	54.348	6505	38.445
D	**Kadwa System**														
1	Upper Kadwa		9.510												
2	Kadwa Dam	4350.000	35.610	1291	37.460	1535	34.480	1465	38.565	1423	37.244	1893	32.421	1521	36.034
	Total of Kadwa System	4350.000	45.120	1291.000	37.460	1535.000	34.480	1465.000	38.565	1423.000	37.244	1893.000	32.421	1521.000	36.034
E	**Darna System**														
1	Bhawali Dam	637.000	7.080	0	0.000	0	0.000	0	0.000	47	0.190	55	0.224	20	0.083
2	Darna Dam	13190.000	14.619	1159	4.311	1154	5.887	1973	7.886	1283	4.238	1369	5.643	1388	5.593
3	Mukane Dam	340.000	1.680	732	5.521	666	2.290	646	4.646	646	4.030	706	4.510	679	4.199
4	Waldevi Dam	744.000	15.110	330	1.654	351	2.410	333	2.500	383	2.020	388	2.520	357	2.221
5	N.M.Weir (Godavari canal) & Gangapur Project	13579.000	246.390	8913	99.229	8912	135.768	6634	66.914	6870	47.068	10776	133.253	8421	96.446
6	N.M.Express Canal	19136.000	231.430	750	25.640	1354	36.580	807	26.930	1940	25.320	4841	55.160	1938	33.926
	Total of Darna System	47626.000	516.309	11884	136.353	12437	182.935	12393	108.876	13169	82.866	24135	201.310	13803	142.468
F	**Palkhed**														
1	Karanjwan	1009.000	5.120	1140	8.469	1214	4.994	1046	3.206	1042	2.745	1118	5.278	1112	4.938
2	Waghad	4320.000	26.900	2616	21.707	2020	25.648	2488	17.569	2210	12.486	2668	22.191	2400	19.920
3	Punegaon	4470.000	16.340	658	5.233	892	4.800	965	3.109	959	3.340	1147	7.281	924	4.753
4	Ozarkhed	6656.000	41.680	1928	18.532	2150	21.700	2313	7.296	1582	6.060	2947	21.313	2184	14.980
5	Palkhed	19250.000	167.150	9380	100.090	9819	103.246	6329	40.533	8099	73.524	9832	105.068	8692	84.492
6	Tisgaon	1105.000	6.120	353	2.012	367	2.335	191	0.426	323	0.896	370	2.695	321	1.673
	Total of Palkhed System	36810.000	263.310	16075	156.043	16462	162.723	13332	72.139	14215	99.051	18082	163.826	15633	130.756

Sr. No.	Name of Dam/ System	Planned Rabi Use		Yearwise Rabi use (Irrigation)											
		Area (Ha.)	Water Use (Mm^3)	2007-08		2008-09		2009-10		2010-11		2011-12		Average	
				Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)	Area irrigated (Ha.)	Water Use (Mm^3)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
G	**U/s of Jayakwadi**														
1	Tembhapuri	735.000	12.750	421	3.000	363	2.590	370	2.680	345	2.460	190	1.360	338	2.410
2	Dheku	1370.000	8.420	435	0.500	606	0.480	150	0.857	143	0.233	277	0.560	322	0.526
3	Kolhi	231.000	1.103	76	0.180	175	0.187	62	0.319	53	0.215	106	0.125	94	0.205
4	Narangi	800.000	2.280	566	3.080	253	3.000	0	0.000	105	1.080	0	0.000	185	1.432
5	Bor Dahegaon	1280.000	7.380	00	0.520	191	2.300	265	2.350	467	2.850	0	0.000	205	1.604
6	Ambadi	1009.000	2.780	0	0.000	371	1.911	289	1.400	857	4.430	238	1.317	351	1.811
7	Shivana Takli	4739.000	31.172	1396	10.280	542	6.970	315	2.610	726	8.250	1414	13.400	877	8.310
	Total of U/s of Jayakwadi	10164.000	65.885	2994	17.560	2501	17.976	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Grand Total	23170.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Annexure -7

Information about Hot Weather utilizations from Major and Medium projects in Upper Godavari (upto Paithan dam) sub-basin

Sr. No.	Name of Dam/ System	Planned H.W. Use		Yearwise Hot Weather use (Irrigation)											
				2007-08		2008-09		2009-10		2010-11		2011-12		Average	
		Area (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	**Mula system**														
1	Mandohal Medium Project	0	0.00	132	0.80	46	0.26	211	3.84	171	1.88	0	0.00	112	1.36
2	Mula	0	0.00	12303	230.44	15789	276.57	21638	242.31	22525	374.55	25255	241.73	19502	273.12
	Total of Mula System	0	0.00	12435	231.24	15835	276.83	21849	246.15	22696	376.43	25255	241.73	19614	274.48
B	**Pravara System**														
1	Bhandardara	6072	164.30	3528	159.12	4755	131.15	7599	166.85	5216	205.56	7143	132.03	5748	158.94
2	Nilwande	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3	Adhala system														
4	Adhala Dam	1354	8.97	950	9.86	963	11.38	907	9.33	805	14.75	0	1.67	725	9.06
5	Bhojapur Dam	0	0.00	0	1.07	0	0.00	0	0.00	189	0.78	0	0.00	38	0.37
	Total of Pravara System	7426	173.27	4478	170.05	5718	142.53	8506	176.18	6210	221.09	7143	133.70	6511	168.37
C	**Gangapur System**														
1	Gautami Godavari Dam	0	8.60	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2	Kashyapi Dam	0	3.40	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
3	Gangapur Dam	0	71.21	1571	15.76	1511	14.76	1363	10.88	1656	22.67	1767	19.43	1574	16.70
4	Alandi Dam	0	0.00	1203	14.78	1098	10.81	964	7.51	984	12.68	1073	10.48	1064	11.25
	Total of Gangapur System	0	83.21	2774	30.54	2609	25.57	2327	18.39	2640	35.35	2840	29.91	2638	27.95
D	**Kadwa System**														
1	Upper Kadwa		1.37												
2	Kadwa Dam	203	3.67	249	4.70	461	7.54	434	9.48	347	7.90	207	2.76	340	6.47
	Total of Kadwa System	203.00	5.04	249.00	4.70	461.00	7.54	434.00	9.48	347.00	7.90	207.00	2.76	340.00	6.47
E	**Darna System**														
1	Bhawali Dam	52	0.59	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2	Darna Dam	8793	5.948	343	2.78	313	2.43	1	0.01	413	3.65	528	2.62	320	2.30
3	Mukane Dam	0	0.00	245	2.59	242	0.30	0	0.00	227	1.86	201	1.67	183	1.29
4	Waldevi Dam	0	2.64	228	1.90	234	2.12	0	0.00	223	1.82	239	2.10	185	1.59
5	N.M.Weir (Goda canal) & Gangapur Project	4969	100.25	5466	92.42	3509	114.13	1973	62.32	3129	135.23	2816	47.90	3379	90.40
6	N.M.Express Canal	6992	84.56	102	7.22	87	14.46	0	0.00	670	13.33	273	7.01	226	8.50
	Total of Darna System	20806	193.98	6384	106.91	4385	133.44	1974	62.33	4662	155.89	4057	61.30	4293	104.08
F	**Palkhed System**														
1	Karanjwan	0	0.00	196	1.45	268	1.44	136	0.62	381	1.47	128	1.53	222	1.30
2	Waghad	0	0.00	1888	18.63	2101	17.92	2194	14.88	1779	14.90	2072	13.74	2007	16.01
3	Punegaon	0	0.00	920	7.05	950	6.96	999	7.42	1026	6.66	1153	5.08	1010	6.63
4	Ozarkhed	0	0.00	2336	25.93	2287	19.80	2755	12.58	2670	11.70	2190	13.94	2448	16.79
5	Palkhed	783	4.93	734	6.83	648	18.52	726	2.70	755	21.24	1005	4.49	776	10.76
6	Tisgaon		0.00	150	1.13	151	1.45	399	1.32	337	1.88	250	1.27	251	1.41
	Total of Palkhed System	783	4.93	6224	61.01	6405	66.09	7209	41.52	6948	58.85	6798	40.05	6714	52.90

Sr. No.	Name of Dam/ System	Planned H.W. Use		Yearwise Hot Weather use (Irrigation)											
		Area (Ha.)	Water Use (Mm3)	2007-08		2008-09		2009-10		2010-11		2011-12		Average	
				Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)	Area irrigated (Ha.)	Water Use (Mm3)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
G	U/s of Jayakwadi														
1	Tembhapuri	1150	0.00	0	0.00	53	0.38	7	0.05	165	1.18	136	0.97	72	0.52
2	Dheku	0	0.00	0	0.00	100	0.86	164	0.41	124	0.65	125	1.37	121	0.65
3	Kolhi	10	0.31	0	0.00	70	0.19	73	0.14	73	0.21	0	0.00	43	0.11
4	Narangi	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
5	Bor Dahegaon	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
6	Ambadi	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
7	Shivana Takli	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	Total of U/s of Jayakwadi	**1160**	**0.31**	**0**	**0.00**	**223**	**1.43**	**244**	**0.60**	**362**	**2.04**	**378**	**6.24**	**353**	**5.18**
	Grand Total	**30378**	**460.75**	**32544**	**604.44**	**35635**	**653.42**	**42544**	**552.65**	**43845**	**857.05**	**46677**	**515.68**	**40460**	**639.43**

G.E. Aibad.

C.E. N.M.R.

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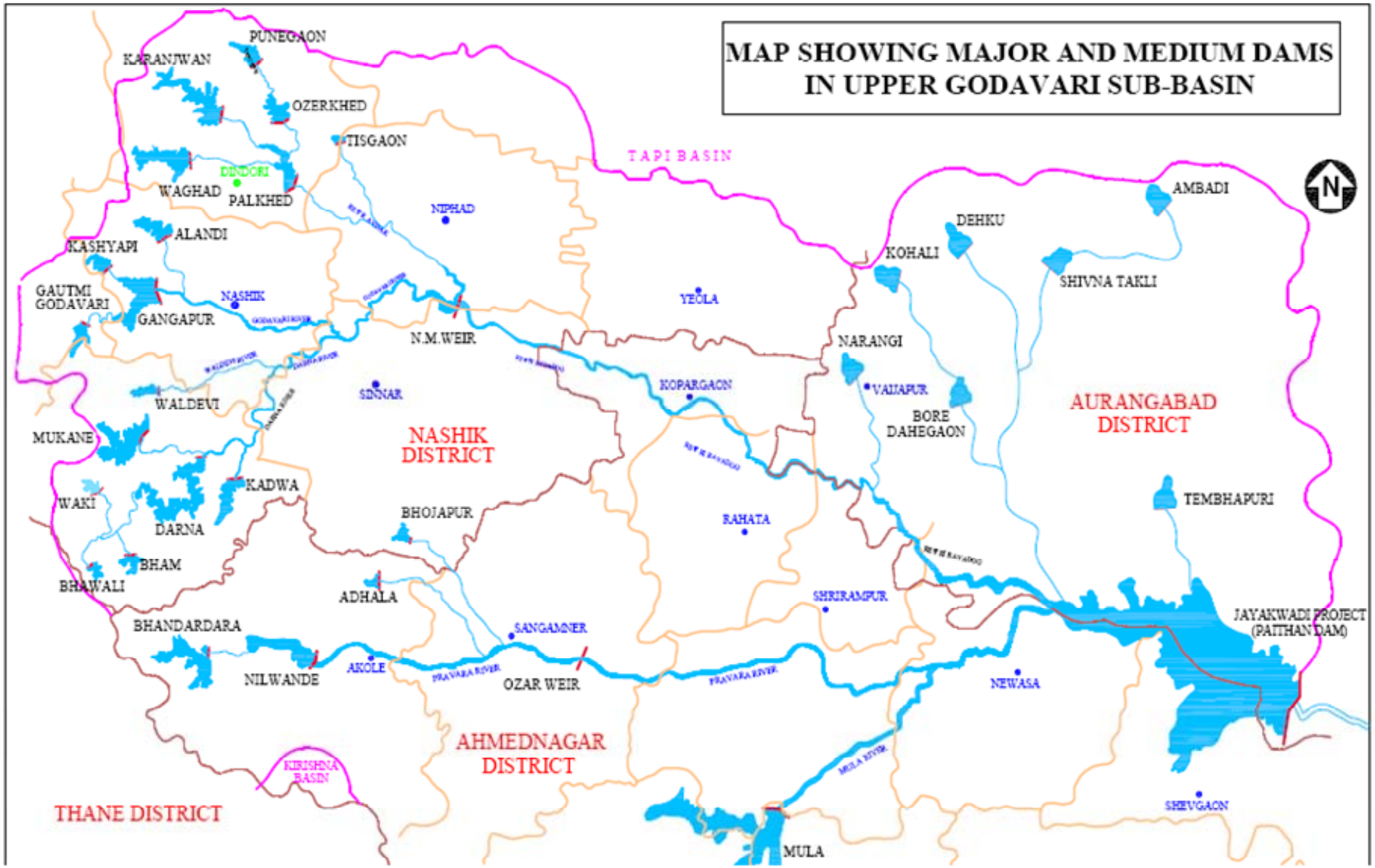
MAP SHOWING MAJOR AND MEDIUM DAMS
IN UPPER GODAVARI SUB-BASIN
PUNEGAON
KARANJWAN
OZERKHED
TISGAON
TAPI BASIN
DINDORI
WAGHAD
PALKHED
NIPHAD
ALANDI
KASHYAPI
GAUTMI
GODAVARI
NASHIK
GANGAPUR
YEOLA
N.M.WEIR
SINNAR
WALDEVI
MUKANE
NASHIK
DISTRICT
KOPARGAON
KADWA
WAKI
DARNA
BHOJAPUR
RAHATA
BHAM
BHAWALI
ADHALA
BHANDARDARA
SANGAMNER
AKOLE
NILWANDE
PRAVARA RIVER
OZAR WEIR
AHMEDNAGAR
DISTRICT
KIRISHNA
BASIN
THANE DISTRICT
MULA
MULA RIVER
SHEVGAON
NEWASA
SHRIRAMPUR
JAYAKWADI PROJECT
(PAITHAN DAM)
TEMBHAPURI
AURANGABAD
DISTRICT
BORE
DAHEGAON
VAIJAPUR
NARANGI
KOHALI
DEHKU
SHIVNA TAKLI
AMBADI
N