

# Water Resources Potential and Development in Marathwada Region (Maharashtra State -India)

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*Received: 1 January 1970 Accepted: 1 January 1970 Published: 1 January 1970*

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## Abstract

Maharashtra is the second highest populated, third largest in area and the second most industrialized state in India. The state of Maharashtra came into existence on 1st May 1960. The Geographical location of the Maharashtra is bounded between latitude 16.40 to 22.10 N and longitude 72.60 to 80.90 E. As per 2011 census, the total population of Maharashtra is 112.37 Million, which is 9.29

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## *Index terms—*

### 1 I. Introduction

Maharashtra is the second highest populated, third largest in area and the second most industrialized state in India. The state of Maharashtra came into existence on 1st May 1960. The Geographical location of the Maharashtra is bounded between latitude 16.40 to 22.10 N and longitude 72.60 to 80.90 E. As per 2011 census, the total population of Maharashtra is 112.37 Million, which is 9.29% of the India's population (1210.19 Million). The State has the geographical area of 0.307 Million Sq. Km., which is about 9.4 per cent of the total area of India. The average rainfall of the State is approximately 1360 mm. The maximum rainfall, about 88 per cent occurs in four months between June to September, about 8 per cent between October to December and remaining 4 per cent after December. Further, rainfall is ranging from 400 mm to 6000 mm in different parts of the State. It is revealed from this, that there is significant variation in rainfall distribution and its occurrence. The State witnesses frequent drought conditions. Almost 42.5% area of the State is drought prone.

Water is a prime natural resource, used for multiple uses as domestic, irrigation, industry, power generation, navigation etc. Water is fundamental resource to life, livelihood, food security and sustainable development. Water which was once considered as abundant has now become a scarce & economic resource. Water should be used in judicial and integrated manner to maximize economic and social welfare.

The distribution of water resources is uneven over a large part of the State. Such area is therefore, water deficit whereas a small part is bestowed with abundance in water. The State Water Policy formulated by the Government of Maharashtra in year 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.

### 2 II. Water Resources in Maharashtra

Total water resource on earth is estimated to be about 1400 million cubic Km, which is 0.25% of the planet's mass and if spread evenly over its surface, it would cover the planet to a height of 2.7 Km. But more than 97% is in the form of oceans and seas, 2% is locked in ice-caps and glaciers and a large portion of remaining 1% lies far too deep in the ground to exploit. Thus only 0.2 million cubic km is fresh water in rivers, lakes, swamps, reservoirs and 23.4 million cubic km is ground water which is mostly saline.

India is second largest populated country in the world, having 16% of the world's population with just 4% of water resources. The main source of water is annual precipitation including snow fall, has been estimated to be of

## 6 VI. WAY FORWARD

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44 the order of 4000 Billion Cubic Meter (BCM). More than half of that, returns to atmosphere by evaporation and  
45 seepage in to the ground. The balance water resource, which occurs as natural run off in the rivers is estimated  
46 to 1869 BCM, considering both surface and ground water.

### 47 3 a) Surface Water Allocated by the Tribunal

48 There are different

## 49 4 III. Water Potential in Marathwada

50 The sub basin wise surface and ground water potential available in Marathwada is given below.

### 51 5 a) Surface Water Potential in Marathwada

52 The yield calculated for various dependability, is the surface water available on the ground in the number of  
53 sub basins. The yield at 75% dependability is generally considered for the design of the projects. But, whole  
54 quantity of surface water available cannot be Year 2022 ( ) The most effective ways to increase the irrigation  
55 potential for increasing the food grain production, mitigate floods and droughts and reduce regional imbalance  
56 in the availability of water is considered to be the inter-linking of the rivers to transfer water from the surplus  
57 rivers to deficit areas.

58 The criteria for the classification of the basin or sub basin is decided as per the guide lines given in the Report  
59 of Maharashtra Water and Irrigation Commission (1999) as given below. In almost all the basins, except WFR  
60 basin in the State, planning of the available water is completed. Some basin and sub-basin are facing the problems  
61 of shortage of water due to lesser availability of natural or allotted water, as well as increase in demand both for  
62 irrigation and non-irrigation purposes. Whereas some basins e.g. WFR basin in the State have surplus water.  
63 In order to meet the demand of deficit basins, intra state water transfer schemes similar on the line of interstate  
64 water transfer schemes are proposed. Those schemes include inter basin transfer as well as intra basin water  
65 transfer (Inter sub basin) within the State. The details of planning for Transfer of water from surplus sub-basins  
66 to deficit sub-basins in the State are given in the Thus the total use of 230 TMC of water will be done from  
67 WFR basin out of total available water of 440 TMC in northest Konkan up to Ulhas sub basin.

## 68 6 VI. Way Forward

69 While studying the water resources development and management in the State the quantity of basin-wise water  
70 available is calculated by considering 75% dependable yield, the sub-basin wise catchment area and the respective  
71 run-off. As the rivers are flowing Inter-States (except WFR) the water allotted by the Tribunals is considered for  
72 utilizing in the respective basins of the State. The surface water is proposed to be used for developing irrigation  
73 potential and for Non Irrigation use like domestic and industrial purposes. As per the guidelines for sectoral  
74 water use, prescribed by the Maharashtra Water Resources Regulatory Authority (MWRRA) about 25% storage  
75 of dams is proposed for N.I. use and rest of storage is used for developing irrigation potential in the command  
76 area of the project.

77 Similarly the inter basin river linking proposals in Maharashtra State are in advance stage of planning for  
78 transfer of surplus water from the West Flowing Rivers (WFR) of Konkan Basin to Godavari Basin, Krishna  
79 Basin and Tapi Basin. The State has finalized the Integrated State Water Plan (ISWP), and the guidelines for  
80 transfer of water from surplus sub basins to deficit sub basins are also given very clearly. Accordingly the sub  
81 basin-wise planning is done for all six basins in the State. <sup>1</sup>

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1500

Figure 1: Below 1500

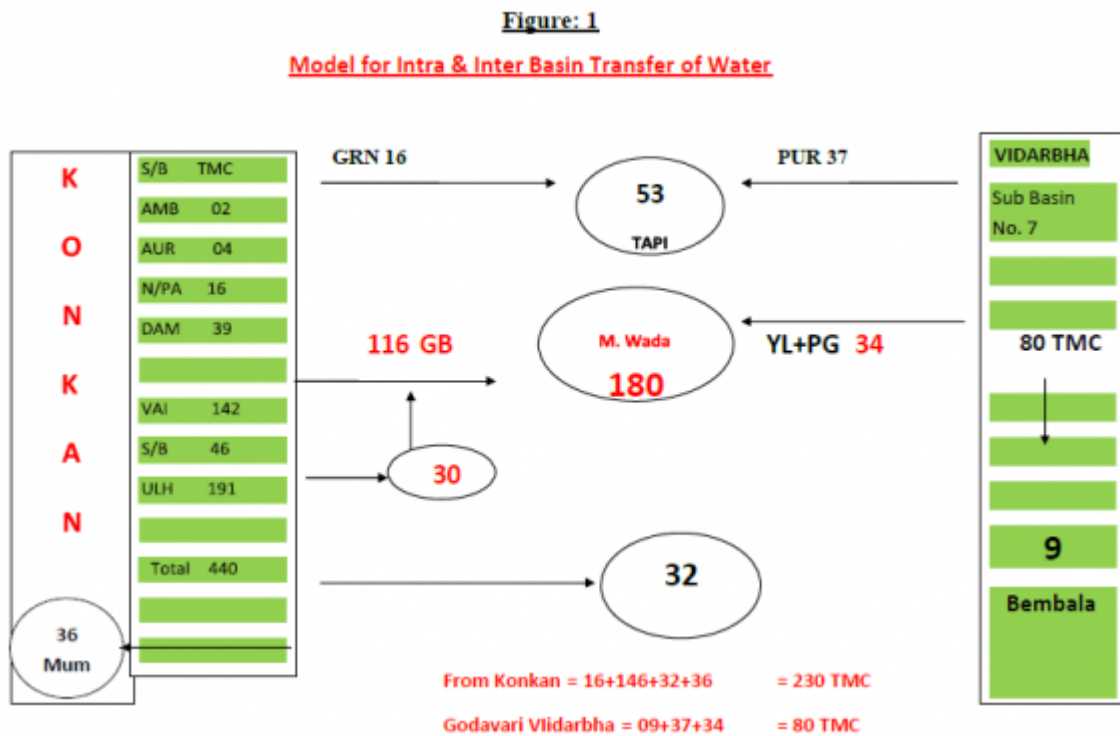


Figure 2:

**No3**

b) Ground Water Availability in Maharashtra

Groundwater is one of the most important natural resources on the earth. It plays important role in maintenance of economy, environment and standard of living of any society in the state. In absence of

immediate availability of surface-water sources, a large population depends upon ground-water. It is equally important in a river basin management. It has been the primary source of water supply for domestic, agriculture and industrial purposes.

Table No. 2: Details of Ground Water Available in Maharashtra

(Figure in Col. No. 5 to 6 in Mcum)

Source: Integrated State Water plan for Maharashtra (2018), Water Resources Department, Government of No. 148,180 Groundwater Surveys & Development Agency (GSDA) and CGWB have carried out the Groundwater Assessment, in the Year 2011-12, watershed-wise recharge, and annual gross groundwater draft and Sr. No. (1) 1 2 3 4 5 6 7 groundwater availability. Source: Integrated State Water plan for Maharashtra (20 No.264, 265 & 271

Figure 3: Table No . 3 :

used  
in  
the

Sr. No.	Sub basin	No. of Water sheds	Catchment area (sq.km)	Net Recharge
(1)	(2)	(3)	(4)	(5)
1	Godavari	807	152598	17498
2	Krishna	315	69425	7817
3	Tapi	299	52058	4651
4	WFR (Konkan)	91	31780	2264
5	Narmada	8	1048	35
6	Mahanadi	4	354	27
	Total	1524	307263	32292

Sr. No.	Basin	Catchment Area (Sq. km)	%	Surface Water Available (Mcum)	Surface v
(1)	(2)	(3)	(4)	(5)	(6)
1	Godavari	152598	49.8	38607	29023
2	Krishna	69425	22.7	29300	16562
3	Tapi	52058	16.8	7027	5995
4	WFR	31780	10.3	64219	64219
5	Narmada	1048	0.3	308	308
6	Mahanadi	354	0.1	102	103
	Total:	3,07,263	100	1,39,562	1,16,210

[Note: Table No. 4: Details of Surface Water Available & Allotted in Marathwada Source: Integrated State Water plan for Maharashtra (2018), Water Resources Department, Government of Maharashtra, vol. I. Page No. 227 & 281 b) Ground Water Potential in Marathwada]

Figure 4: J

No5

Water Resources Potential and Development in Marathwada Region (Maharashtra State -India)

Table No. 6: Basin-wise Surface & Ground Water Available in Marathwada

Source: Integrated State Water plan for Maharashtra (2018), Water Resources Department, Government of Maharashtra, vol. I. Page No. No. Sub Basins Cultivable Area (LHa) Surface Water (Mcum) Avail. Allotted 1 2 3 4 5 1 Middle Godavari 15.88 2720 1826 2 Dudhana 4.49 398 368 3 Purna 8.06 1829 1338 4 Sudha-Suvarna 0.38 171 56 5 Manjra 6.86 758 623 6 Terna 3.01 274 226 7 Lendi 1.45 316 212 8 Manar 2.27 247 247 9 Kayadhu 1.88 333 333 10. Penganga (Ptly) 3.85 2055 869 11. Bhima (Up) (Ptly) 5.54 1543 1468 Total 53.67 10644 7566 Sr. No. Sub Basins No. of water sheds Geographical area in LHa Net Recharge G.W. in Mcum 100% 70% 1 2 3 4 5 6 1 Middle Godavari 82 17.21 2551 1768 9 Kayadhu 09 2.24 360 252 10. Penganga (Ptly) 20 3.80 364 250 11. Bhima (Up) (Ptly) 35 5.83 612 417 Total 341 61.51 7773 5425 Source: Integrated State Water plan for Maharashtra (2018), Water Resources Department, Government of Maharashtra, Vol.-I Page No.264, 265 & 271 IV. Water Resources Development in Marathwada Source: Integrated State Water plan for Maharashtra (2018), Water Resources Department, Government of Maharashtra, Vol.-I Page No. 236 & 482 b) Ground Water Development in Marathwada The ground water assessment is carried out in the State by the Groundwater Survey and Development Agency (GSDA) in the year 2011-12. The information is compiled as watershed-wise recharge annual gross and industrial water supply needs to be kept reserved, based on projected population. Water resources Development planning for each sub-basin is based on the available water Sr. No. Sub Basin Surface water Allotted (Mcum) GW Total Water Avail. (70 % of Avail. (Mcum) Recharge) (3+4) In Mcum (1) (2) (3) (4) (5) 1 Middle Godavari 1826 1768 3594 2 Dudhana 368 440 808 3 Purna 1338 986 2324 4 Sudha-Suvarna 56 69 124 5 Manjra 623 602 1225 6 Terna 226 268 494 7 Lendi 212 141 353 8 Manar 247 232 479 9 Kayadhu 333 252 585 10. Penganga (Ptly) 869 250 1119 11. Bhima (Up) (Ptly) 1468 417 1885 Total: 7566 5425 12991 Sr. No. Sub Basin Nos. of Projects Total Irrigation in Hectare Water use in (Mcum) Completed On-going 1 Middle Godavari 331 46 377 224577 1292.09 2 Dudhana 106 16 122 92019 498.50 3 Purna 181 53 234 141604 1433.37 4 Sudha-Suvarna 17 04 021 5069 30.63 5 Manjra 178 10 188 101493 660.05 c) Sr. 2 Dudhana 38 6.04 629 6 Terna 104 02 106 63455 312.96 440 3 Purna 68 10.25 1409 7 Lendi 99 04 103 49040 261.04 986 4 Sudha-Suvarna 03 0.80 98 8 Manar 215 15 230 82679 537.82 69 5 Manjra 37 7.23 860 9 Kayadhu 24 07 031 37461 246.79 602 6 Terna 16 3.24 383 10. Penganga (Ptly) 111 19 130 118084 810.0 268 7 Lendi 12 2.01 202 11. Bhima (Up)(Ptly) 160 10 170 177971 626.80 141 8 Manar 14 2.86 305 232 Total 1526 186 1712 1093452 6710.05

groundwater draft and ground water availability for use of various purposes like driving irrigation and industry.

The assessment of total annual ground water recharge and net annual ground water availability (70%) recharge is given below. Annual gross ground water draft from irrigation wells, domestic wells and bore wells is also given in the table. The allocation for domestic

[Note: a) Surface Water Development in Marathwada resources in the Sub-Basin subject to the allocation within framework of the tribunal award, present scenario and future planning so as to obtain the optimal utilization of available water resources. The details of sub-basin wise irrigation development and water use are given in the Table no.7. Table No. 7: The details of irrigation projects and water use in Marathwada]

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**No8**

Source: Integrated State Water plan for Maharashtra (2018), Water Resources Department, Government of Maharashtra, Vol.-I Page No. 204  
V. Water Transfer within the State of Maharashtra

Figure 6: Table No . 8 :

**no9**

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Figure 7: Table no . 9 .

Sr. No.	Sub Basins of water sheds	No. of G.W. in Mcum	Net Recharge in Mcum 70%	Draft in GW use) Mcum	Future use in (Col. 5-6)	No. of addl. Wells for Irri.
1	2	3	5	6	7	8
1 Middle Godavari		82	1768	1172	596	39765
2	Dudhaha	38	440	391	49	3261
3	Purna	68	986	758	228	15201
4	Sudha-03		69	25	44	2928
	Suvarna					
5	Manjra	37	602	609	-7	0
6	Terna	16	268	322	-54	0
7	Lendi	12	141	87	54	3623
8	Manar	14	232	101	131	8683
9	Kayadli	10	252	156	96	6426
10. Penganga (Ptly)		20	250	125	125	8656
11. Bhima (Up) (Ptly)		35	417	237	180	9520
	Total	341	5425	3621	1442	98063

Maharashtra State is covered by six river basins viz. Godavari, Krishna, Tapi, West Flowing Rivers (WFR-Konkan), Narmada and Mahanadi basins. Large variation of natural surface water availability within basins and sub-basins exists in Maharashtra State in general. Average annual surface water availability varies from 0.16 Mm<sup>3</sup>/Sq.Km. in Tapi basin to 2.07 Mm<sup>3</sup>/Sq.Km. in west flowing river basin. Projects for interstate water transfer, inter-basin water transfer within State, as well as inter-sub-basin water transfer, are in existence and are also being planned. Shortage of water resources, continuous drought situations or flood situations, demand planning of such water transfer projects in aggrieved sub-basin or water deficit sub-basin in particular.

Figure 8: J



**No9**

Sr. No.	Donor Basin (Surplus)			Donee Basin (Deficit)			Total (5+7)	
	Basin	Qty. MCum (TMC)	Intra Basin	Qty. MCum (TMC)	Inter Basin	Qty. MCum (TMC)	Col. (TMC)	Mcum. (TMC)
1	2	3	4	5	6	7	8	
1.	Godavari	2261	Vidarbha (Bembala M.Wada (Penganga) (Yeldari)	257	Tapi (Purna)	1051	1308	
				553	-	-	-	
				400	-	-	553	
	Total	2261 (80)		1210 (43)	-	1051 (37)	400	2261 (80)
					I. Godavari			1000
			Mumbai (Domestic Water)		M. Wada	3297		3297
2.	WFR	12448		1000	Jayakwadi	850	850	
					II. Krishna	890	890	
					III. Tapi	463	463	
	Total	12448 (440)	-	1000 (35)	-	5500 (195)	6500 (230)	
	G.Total (TMC)	14709 (520)	-	2210 (78)	-	6551 (232)	8761 (310)	

[Note: (Information compiled from the available details of the Integrated State Water Plan) From the above table, it is seen that, the Godavari basin, in Vidarbha region is having 2261 Mcum (80 TMC) of surplus water in some sub basins, after keeping water up to 8000 Cum/Ha of culturable area (Normal Basin) for the use of those sub basins themselves. The surplus water is distributed as below. © 2022 Global Journals Year 2022 ( )]

Figure 9: Table No . 9 :

Figure 10: J



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82 [ Maharashtra water irrigation commission Report () ] , *Maharashtra water & irrigation commission Report*  
83 1999.

84 [Mwrra Act ()] , Mwrra Act . 2005.

85 [ Report of the higher level committee on balanced regional development issues in Maharashtra. i.e. Dr. Kelkar Committee Report  
86 , *Report of the higher level committee on balanced regional development issues in Maharashtra. i.e. Dr.*  
87 *Kelkar Committee Report* 2013.

88 [Wrd and Maharashtra ()] , Govt Wrd , Maharashtra . 2019. (Integrated State Water Plan)

89 [Bansil ()] *A book on water management in India*, P C Bansil . 2004.

90 [Central water commission (2013) report on water and related statistics] *Central water commission (2013) re-*  
91 *port on water and related statistics*, GOI.

92 [Ministry of water resources G.O.I [www.mowr.nic.in](http://www.mowr.nic.in) (2007)] *Ministry of water resources G.O.I*  
93 *[www.mowr.nic.in](http://www.mowr.nic.in)*, 2007-07-15.

94 [State Ground Water and Development Act ()] *State Ground Water and Development Act*, 2009.

95 [Water Resources Department ()] *Water Resources Department*, (Govt. of Maharashtra) 2016-17. (Irrigation  
96 status report)