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Research Papers

# Storage and Usage of Water in Maharashtra under Irrigation

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## Abstract

*Total Bulk Water Entitlement: for a task/ waterway framework/ storeroom for any watering system season or year is the aggregate of all Bulk Water Entitlements decided for the different classifications.*

*Total Water Entitlement: Aggregate Water Entitlement on account of Irrigation is aggregate of Entitlements issued to Water User Associations at distributaries/ limb/ fundamental trench level and if there should arise an occurrence of non watering system is entirety of Entitlements issued to different water client Entities like drinking water/ Industrial water. Watering system Aggregate Water Entitlement can likewise incorporate non watering system Entitlements on the off chance that it is using pressurized water conceivable to make the supplies from a typical point.*

Allotment: in appreciation of a part of a watering system Water Users Association implies the segment of the regular or yearly Entitlement decided for the Association by the River Basin Agency/ Prescribed Authority allocable to the part and is touched base at by reproducing the Prescribed Unit Water Use Entitlement by the part's holding.

By the end of June 2003, there were 53 major, 212 medium and 2445 minor projects (state sector) on which irrigation potential was created. Also 2276 minor (local sector) projects were completed in the state. Besides this 4803 k.T weirs, diversion weirs etc, were also completed. The irrigation potential created in the state by the end of June 2003 through all these major medium and minor projects (state & local sector) taken to gather is 5.08 Mha Comprising of 3.86 Mha from state sector and 1.22 Mha from local sector. The irrigation potential likely to be created through completed and on going and planned projects from state sector and local sector is about 8.59 Mha. The figures of irrigation potential likely to be created, shows that planning and efforts are being made to achieve the target of ultimate irrigation potential estimated by commission.

Water storage and water use for the last 7 years ending with 2003 – 2004 for the major medium and minor (state sector) projects are presented in the following table No. 3.1 below

Table No. 3.1
Projected live water storage & water use (1997 – 98 to 2003 – 04)

(Water storage in Mm3)

| Year | Projected Designed Storages | Storage As on 15 th Oct | % Of available Water | Water Use for Irrigation | Water use for non irrigation | Total water use | % Of total water use to available storage |
|---|---|---|---|---|---|---|---|
| 1997-98 | 25528 | 16615 | 65% | 10639 | 3268 | 13906 | 84% |
| 1998-99 | 26712 | 23285 | 87% | 12347 | 3033 | 15380 | 66% |
| 1999-00 | 26716 | 25271 | 95% | 16037 | 3595 | 19632 | 78% |
| 2000-01 | 26748 | 18947 | 71% | 13575 | 3858 | 17433 | 92% |
| 2001-02 | 28062 | 17817 | 63% | 12346 | 3980 | 16326 | 92% |
| 2002-03 | 28715 | 18936 | 66% | 12965 | 4236 | 17201 | 91% |
| 2003-04 | 28840 | 16941 | 59% | 10569 | 4790 | 15359 | 91% |

Source – The Irrigation status Report in Maharashtra year 2004

It is seen from the above table that the projected storages of the major medium and minor (state sector) projects has been increased from 25528 Mm3 in the year 1997 – 98 to 28840 Mm3 in the year 2003-04.However as compared to design storages the actual storages as on 15th Oct. are with the range of 59% to 95%. In the year 2003-04 the actual storage as on 15th Oct is the lowest in comparison to last five years The percentage of the total water use in the rang of 66% to 92%.

The water storage in the reservoir is used for irrigation as well as non-irrigation purpose. Further the water for non-irrigation is being used for industries and domestic purpose. Due to industrialization and urbanization the non-irrigation use is continuously increasing considerably. The water used for non-irrigation from 1997-98 to 2003-04 was in the range of 18% to 31% of the total water used. In the year 2003.-04 out of the total water used 31% (4790 Mm3) water has been utilized for non-irrigation purpose and out of the total non-irrigation water use (4790 Mm3) 64% is used for domestic purpose and industrial and other use together is 36% water supply to drinking and industry has priority over irrigation as per the states water policy. Increase in demand for these purpose results in less water availability for irrigation.

### 3.2 Irrigation Potential Created in Maharashtra:-

Large number of major medium and minor (state sector) irrigation projects has been taken up by the Irrigation Department of the state, to maximize area under irrigation. By the end of June 2003 there are 53 major 212 medium and 2445 minor projects in the state, partly or fully completed. Hardly 0.274 Mha Irrigation potential was created in the state prior to independence. By the end of year 1960, 0.386 Mha. Irrigation potential was created During the Five year plan the state has created an additional irrigation potential of 3.477 Mha by the end of June 2003.

Table No. 3.2
Irrigation Potential Created Through Major, Medium And Minor Projects In The State Of Maharashtra

(Area in Mha.)

| Year | TOTAL POTENTIAL CREATED (Area in Mha.) | | |
|---|---|---|---|
| | Major & Medium Projects | Minor Projects | Total |
| June 1960 | 0.314 | 0.072 | 0.386 |
| June 1997 | 2.466 | 0.762 | 3.228 |
| June 1998 | 2.632 | 0.784 | 3.416 |
| June 1999 | 2.665 | 0.835 | 3.500 |
| June 2000 | 2.813 | 0.893 | 3.706 |
| June 2001 | 2.856 | 0.913 | 3.769 |
| June 2002 | 2.882 | 0.930 | 3.812 |
| June 2003 | 2.907 | 0.956 | 3.863 |

Source – Irrigation Status Report in Maharashtra Year 2004

The irrigation potential created in the state by the end of June 2003 through major, medium and minor state sector irrigation projects taken together was 3.863 Mha. The share of major; medium projects and minor projects in the total irrigation potential created is 75.3% and 24.7% respectively. By the end of 2003 the ultimate irrigation potential of total 2710 major or medium & minor (state sector) irrigation projects in the state is estimated to 4.417 Mha out if which the irrigation potential created by the end of 2003 is 3.863 Mha (87%). During 2002-03, the net area sown in the state is 17.579 Mha. The irrigation potential created by the end of June 2002 through major, medium & minor state was 3.812 Mha. which amount to 22% of the net area sown in the state. Irrigated area is an index of achievement for utilization of potential created. Area irrigated on the canal and wells in the command area together during 1997-98 to 2003-04 is presented in the table below.

Table No 3.3
Year wise Irrigation Potential Created And Area Irrigated In The State From Year 1997-1998 To 2003-2004

(Area in Mha.)

| Sr.No | Year | Irrigation potential created by end of June | Area irrigated | | | % Of area irrigated to potential created |
|---|---|---|---|---|---|---|
| | | | Canal | Wells | Total | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | 1997-98 | 3.228 | 1.202 | 0.475 | 1.677 | 51.95 |
| 2 | 1998-99 | 3.416 | 1.225 | 0.471 | 1.696 | 49.65 |
| 3 | 1999-00 | 3.500 | 1.286 | 0.584 | 1.870 | 53.43 |
| 4 | 2000-01 | 3.706 | 1.298 | 0.466 | 1.764 | 47.60 |
| 5 | 2001-02 | 3.769 | 1.250 | 0.458 | 1.708 | 45.32 |
| 6 | 2002-03 | 3.812 | 1.318 | 0.524 | 1.842 | 48.32 |
| 7 | 2003-04 | 3.863 | 1.235 | 0.441 | 1.676 | 43.39 |

Sources – Irrigation Status Report in Maharashtra year 2004

It is seen from the above table that the irrigated area on canals and wells in the command area taken together during 2003-04 is 1.676 Mha. (43.39%) as against the potential of 3.863 Mha. created by the 2003. It is further revealed from the

figures that the decrease in irrigated area is due to less storage in the reservoir and more reservation of water for drinking. In the year 1999-2000 the water storage of 15th October was 25271 mm3 whereas in the year 2003-04 the water storage of 15th October was 33% less (16941 mm3) than the year 1999-2000.

Further it is pointed out here that though the water used for irrigation on canal in the year 2003-04 (10569 Mm3) is comparatively less than the year 1997-98 (10639 Mm3) the irrigated area in the year 2003-04 is more by 33 thousand ha. Than that of the year 1997-98 (1.202 Mha.) It shows an improvement in the water use efficiency. The irrigation utilization is average 50% compared to potential created.

**The overall reasons for less utilization are as follows: -**

(i) Low water yield in the reservoir.
(ii) Diversion of irrigation water to non-irrigation uses.
(iii) Taking more percentage of crops that require more water like paddy and sugarcane.
(iv) Thin and scattered irrigation, resulting in low efficiency.
(v) Low utilization during kharif (Rainy) season.
(vi) Reduction in the storage capacity due to silting.
(vii) Poor/approximate assessment of the irrigation area in the command. (viii) Non accounting of irrigated area out side the command. (Influence area). (ix) Poor maintenance of the infrastructure due to financial constraints. (x) Non participation of beneficiaries.

**Irrigated Area And Cropping Pattern: -**

Season wise irrigated area is one of the indicators for assessing the cropping pattern existing in the project area. Utilization in kharif season basically depends on the amount and distribution of rains. Demand in kharif is expected only when rains are less or irregular. So variation in irrigated area in kharif season is not desirable for consideration. The variation in irrigated area during rabbi, hot weather season, two seasonal and perennials is a function of cropping pattern being practiced in the area and the storage position.

In order to have an idea about the cropping pattern being practiced in the project area of major, medium and minor projects, season wise data of the irrigated area for the year 1997-98 to 2003-04 is presented in the following table.

Table 3.4
Season-wise irrigated area under the canal water.
(Area in M. ha.)

| Sr.No | Year | Season-Wise irrigated area | | | | | Total |
|---|---|---|---|---|---|---|---|
| | | Kharif | Rabbi | Hot Weather | Tow Seasonal | Perennial | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | 1997-98 | 0.369 (30.7) | 0.398 (33.1) | 0.166 (13.8) | 0.058 (4.8) | 0211 (17.6) | 1.202 (100.0) |
| 2 | 1998-99 | 0.336 (27.4) | 0.425 (34.7) | 0.182 (14.9) | 0.052 (4.2) | 0230 (18.8) | 1.225 (100.0) |
| 3 | 1999-00 | 0.343 (26.6) | 0.493 (38.3) | 0.155 (12.1) | 0.047 (3.7) | 0248 (19.3) | 1.286 (100.0) |
| 4 | 2000-01 | 0.423 (32.6) | 0.478 (36.8) | 0.075 (5.8) | 0.050 (3.9) | 0272 (20 9) | 1.298 (100.0) |
| 5 | 2001-02 | 0.365 (29.2) | 0.478 (38.2) | 0.122 (9.8) | 0.041 (3.3) | 0244 (19 5) | 1.250 (100.0) |
| 6 | 2002-03 | 0.372 (28.2) | 0.548 (41.7) | 0.106 (8.0) | 0.052 (3.9) | 0240 (18 2) | 1.318 (100.0) |
| 7 | 2003-04 | 0.407 (32.9) | 0.506 (41.0) | 0.081 (6.6) | 0.051 (4.1) | 0190 (15 4) | 1.235 (100.0) |

Note: figures in brackets indicate percentages.*Excludes area on wells in command.
Sources - Irrigation Status Report in Maharashtra year 2003-04.

During 2003-04 the total irrigated area was 1.235 Mha. Out of this, the percentage of irrigated area in Rabbi season is highest (41.0%) followed by Kharif (32.9%) and perennial (15.4%). The percentage of the irrigated area in the hot weather and two seasonal was 6.6 and4.1 respectively. It is seen that, in the year 2003-04 the perennial and hot weather crops have been reduced by 50 thousand ha. and 25 thousand ha. respectively, whereas kharif crops have been increased by 35thousand ha. than that of the year 2002-03. It shows that farmers are growing more Rabbi or Kharif crops, instead of perennial and hot weather crops.

At National level, up to 1951 - 9.7 million hectares of land were irrigated by major and medium project constructed before Independence. Up to 1966 an additional irrigation potential of 7.3 million hectares was created by various major and medium projects. A number of projects were under taken and completed, such as Bhakara project in Punjab and the DVC in Bihar and W.Bengal, the Hirakud in Orrissa, the Matatila in Uttar Pradesh, the Tungbhadra in Karnatak and Andhar Pradesh, the Kosi in Bihar the Malamphuza in Kerala the Nagarjun Sagar, the Purna , Bhadra Chambal the Rajasthan canal, Kangsabati, Prambikulam Aliyar and Mahanandi Delta canals. A further irrigation potential of 10 mha was added to this area between 1966 and 1980, after taking up following important irrigation projects- Tungabhadra (Andra Pradesh) Jansura (Assam) Son Barrgge (Bihar) Tawilift Irrigation (Jammu & Kashmir) Hemavatti (Karnataka) Harangi (Karnataka) Karanga (Karnataka), Upper Krishna (Kerala), Bhima, Krishna, Kukadi stage- I Upper Godavari

(Maharashtra) Warna (Maharashtra) and lower Sarda canal (Uttar Pradesh) Thus the irrigation potential created by major and medium projects increased from 9.7 mha in 1951 to 26.6 mha in 1980.

The following Table shows the valley-wise available water reservoir in Maharashtra and sanctioned water reservoir for utilisation.

Table No 3.5
Valley-wise available water reservoir in Maharashtra and sanctioned water reservoir for utilisation

| River valley | Geographical area in Maharashtra (sq.km) | 75% Dependable water Reservoir (TMC) | Sanctioned water Reservoir (TMC) | Percentage of Sanctioned water Reservoir |
|---|---|---|---|---|
| West flowing Rivers | 30394 | 1796 | 730 | 27.82 |
| Tapi | 51254 | 248 | 200 | 7.62 |
| Narmada | 1659 | 248 | 200 | 0.42 |
| Krishna | 70114 | 958 | 594 | 22.64 |
| Godavari | 154341 | 1336 | 1089 | 41.50 |
| **Total** | **307762** | **4349** | **2624** | **100.00** |

Source- water resources Department in Maharashtra year 2003-04.

TABLE 3.6
State-wise Percentage of Irrigated Area
(Area 000 in thousand Ha.)

| Sr. No. | State Union Territories | Net Cultura able Area | Net Irrigated Area | Percentage % |
|---|---|---|---|---|
| 1 | A.P. | 10843 | 4228 | 38.99 |
| 2 | Arunachal Pradesh | 149 | 33 | 22.15 |
| 3 | Assam | 2706 | 572 | 21.14 |
| 4 | Bihar | 7526 | 3348 | 44.49 |
| 5 | Goa | 134 | 22 | 16.42 |
| 6 | Gujrat | 9390 | 2484 | 26.45 |
| 7 | Hariyana | 3519 | 2631 | 74.77 |
| 8 | Himchal Pradesh | 577 | 99 | 17.16 |
| 9 | Jmmu Kashmir | 732 | 307 | 41.94 |
| 10 | Karnataka | 10626 | 2205 | 26.75 |
| 11 | Kerala | 2248 | 334 | 14.86 |
| 12 | M. Pradesh | 19488 | 4572 | 23.46 |
| **13** | **Maharashtra** | **17962** | **2543** | **14.16** |
| 14 | Manipur | 140 | 65 | 46.43 |
| 15 | Meghalaya | 202 | 45 | 22.28 |
| 16 | Mizoram | 65 | 8 | 12.31 |
| 17 | Nagaland | 196 | 59 | 30.01 |
| 18 | Orissa | 6315 | 1979 | 31.34 |
| 19 | Panjab | 4191 | 3904 | 93.15 |
| 20 | Rajshatan | 16268 | 4239 | 26.06 |
| 21 | Sikkim | 95 | 16 | 16.84 |
| 22 | Tamil nadu | 5706 | 2569 | 45.02 |
| 23 | Tripura | 268 | 50 | 18.66 |
| 24 | Uttar Pradesh | 17258 | 10971 | 63.57 |
| 25 | West Bengal | 5334 | 1911 | 35.83 |
| 26 | Delhi | 47 | 37 | 78.72 |
| | **All India –** | **141985** | **49231** | **34.67** |

Source :- Maharashtra Water and Irrigation Commission Report June 1999.

TABLE No 3.7
Yearwise and seasonwise Total Potential created and its Utilisation in Maharashtra Since 1991-92 to 1996-97
(Area in 000 Ha.)

| Year | Potential created | | | | | Potential Utilised | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Kharif | Rabbi | Hot season | Perennial | Total | Kharif | Rabbi | Hot season | Perennial | Total % |
| 1991-92 | 924.59 | 1363.03 | 61.44 | 209.03 | 2558.09 | 359.06 39 % | 476.18, 35% | 77.02 125% | 163.84 78% | 1076.01 42% |
| 1992-93 | 1026.28 | 1409.53 | 91.09 | 152.02 | 2678.99 | 300.69 29 % | 479.61 34% | 102.66 113% | 147.02 97% | 1029.98 38% |
| 1993-94 | 1042.68 | 1421.93 | 80.02 | 165.59 | 2710.22 | 301.35 29% | 468.42 33% | 159.21 199% | 166.08 101% | 1095.78 40% |
| 1994-95 | 1104.25 | 1509.12 | 88.58 | 172.57 | 2874.52 | 338.03 31% | 502.63 33% | 129.44 146% | 185.34 107% | 1155.72 40% |
| 1995-96 | 1023.42 | 1525.06 | 80.01 | 176.46 | 2862.07 | 343.05 34% | 459.36 30% | 72.09 91% | 176.46 100% | 1063.91 37% |
| 1996-97 | 1110.97 | 1569.38 | 77.25 | 194.50 | 3061.88 | 319.64 29% | 484.13 31% | 141.76 184% | 181.24 93% | 1138.96 37% |