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Research Paper

AGRICULTURAL/HORTICULTURAL DEVELOPMENT UNDER IRRIGATION IN MAHARASHTRA

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ABSTRACT

Horticulture in Maharashtra shifts over the State with its amazing fusion of climate, water and soil conditions; depicted differently as 'harsh, continuing and rough', it is customarily a place where there is laborers. The affirmation that the horticulture here is wholesome may not be excessively of a distortion on the grounds that, just about different varieties of soil grown foods, blooms and vegetables and also nourishment grains are created here. The advancement made by the State in the farming and agro-based modern division is a consequence of the endeavors made by imaginative and examination turned agriculturists and also worked ranchers and area workers really meeting expectations in the fields. Subsequently, Maharashtra has a paramount part to play in the farming segment.

Cultivating in Maharashtra is for the most part rain-bolstered kind of cultivating, which is altogether dependant on regular downpours. The aggregate region under development is 225.7 lakh hectares of area, out of which roughly 80 to 85% has arable sort of cultivating, although 16% zone has green cultivating. The State's commitment in the aggregate horrible wage from rural and agro-based mechanical works in the year 2008-09 was 12.1% on the State level and 17.6% on the national.

Maharashtra state is situated in the south west of India. The geographical area of state is 30.8 mha; with cultivable area of about 22.5 mha. It is the third largest state in India. As per 2001 census; its population has touched the figure of 100 million. Agricultural has been the prominent occupation to provide food and fiber to the growing population of the state. The state economy is dependent upon agricultural production. Irrigated facility is regarded as the key element of Irrigated agricultural. The modern agricultural and irrigated practices play a key role in alleviating rural poverty. The state has a tropical climate. The annual rainfall varies from 400 mm to 600-mm. The average rainfall of state is around 1300 mm of which 88 per cent fall during June to September and remaining between October to December. It has therefore, a greater impact on state's water resources planning.

There are around 400 rivers having more than five km length each in Maharashtra. The geographical area of the state is divided in to basins of Krishna, Godavari, Tapi, Narmada, and narrow basins of west flowing rivers of konkan. The average annual availability in above basins is anticipated as 163.82 bcm, out of which permissible use as per inter-state tribunal award is 125.94 bcm. In the following are shown the districts or parts of the lying with in each basin: (percentages indicated in brackets)

Basin	
Districts	
1) Konkan Rivers	: Thane, Raigad
, Ratnagiri-Sindhudurg.	
2) Narmada	: Dhule (11.5%)
3) Tapi	: Amravati (65.7%),

Akola(64.7%)	Buldhana(60.4%),	Jalgaon, Dhule,
Nashik,	(52.8%),	Aurangabad-Jalana(7.0%).
4) Krishna	:	Pune, Solapur, Satara,
Sangli, Kolhapu	Ahmednaga(36.2%)	Beed(14.20%),
Osmanabad(58%)	Latur(31.8%)	
5) Godavari	:	Nashik (47.8%),
Ahmednagar(63.8%),	Aurangabad-Jalana(93.0%)	
Osmanabad Latur	(68.2%),	Nandad, Parbhani, (39.67%)
Buldhana(36.3%)		
Amravati (34.3%)	Yavatmal, Wardha, Nagpur	Bhandara,
Chandrapur, Gadchiroli		

Under the British Rule Irrigation was tackled as a protection measure, rather than as a development activity of substantial importance Maharashtra is a composition of various regions which came together in 1956 when the states Reorganisation took place, Naturally therefore the state has inherited imbalances on various counts including Irrigation .In western Maharashtra a number of Irrigation projects were under taken and completed during the pre-independence and post independence era since a large part of western Maharashtra is drought prone. This has resulted in various regions of the state. Having regard to the fact that Irrigation is a significant fact or contributing to economic development the state Government has decided to initiate corrective action so that the level of Irrigation development in the state will be uniform in all regions of the state. The fact finding committee under the chairmanship of Dr.V.M.Dandekar has estimated that an investment of Rs 1385.92 Crores would be necessary for removing regional imbalance in respect of irrigation development. Out of the VII plan out lay of Rs 1320.70 Crores, Rs 200 Crores are remarkable for reducing regional imbalance in Irrigation development.

2.2 Classification of Dams

As per ICOLD definition the dams are classified as large dams or small dams depending on the height of the dams irrespective of parameters. All dams more than 15 mts. in height are classified large dams and those less than 10 mts.

in height as small dams.

Large dams are further classified as

Category I :-

Dams having height more than 30 meters or gross storage capacity about 60 Mcum or spillway capacity above 3 thousand cumecs or gated spillway.

Category II :-

Dams having height between 15 Mts. to 30 Mts. or gross storage capacity between 15 Mcum to 6 Mcum or spillway capacity between 2000 to 3000 cumecs or ungated spillway.

Category III :-

Dams having height between 10 Mts. to 15 Mts. or gross storage capacity between 1 Mcum to 15 Mcum or spillway capacity between 2000 to 3000 cumecs or having ungated spillway. Maharashtra state has 1427 large dams, highest number in the country as:

Category I: 106 dams

Category II: 723 dams

Category III: 598 dams

2.3 Irrigation Projects

Irrigation projects are classified as minor and major irrigation projects based on cultivable command area projects.

Irrigation projects & its Classification

Sr. No.	Types of project	CCA
1	Minor irrigation projects (Local sector) with the District Council (Zilla Parishad)	Below 100 ha.
2	Minor irrigation projects (Local sector) with the Rural Development & water Conservation Department.	101 to 250 ha.
3	Minor irrigation projects (State sector) with the Irrigation Department.	251 to 600 ha.
4	Large Minor irrigation projects (State sector) with the Irrigation Department.	600 to 2000 ha.
5	Medium irrigation projects (State sector) with the Irrigation Department.	2001 to 10000 ha.
6	Major irrigation projects (State sector) with the Irrigation Department.	Above 10000 ha.

Sources :- Water Resources Department of Maharashtra year 2004.

There are at present 18 Irrigation projects in Maharashtra:-

- 1) Bhima 2) Mula 3) Kukadi 4) Girma 5) Upper Tapi 6) Panzam 7) Krishna 8) Warna 9) Purna 10) Upper Penganga 11) Jayakwadi 12) Manjra 13) Surya 14) Khadakwasla 15) Upper Godavari 16) Pench 17) Upper Wardha 18) Bhatsa.

The aggregate water resources of Maharashtra state have been assessed at 1,16,000 million m³. A systematic study of total possibilities of Irrigation in Maharashtra was undertaken by the Maharashtra state Irrigation commission (1962) under the chairmanship of late shri S.G.Barve. The ultimate Irrigation potential both from surface and underground water resources and 18 lakh hectars from under-ground water resources. It is expected that after the improvement in the management system recommended by the World Bank are carried out the irrigation potential from surface water resources would go up to the level of 61.92 lakh hectars.

The works of strengthening of Bhatghar, Ekrukh and Daran Dams Extension of Krishna Canal, Jayakwadi stage I, strengthening of Radhanagri dam by construction of buttresses Mula and Manjra projects have been completed, as envisaged. The Majalgawn Dam (part of Jayakwadi Project) Veer Baji Pasalkar Dam (part of Khadakwasla Project) are completed Substantial progress has been achieved on the Dudhganga Dam also. Upper Tapi Stage-I and Surya projects are also completed. Notable progress has been making on the lower Terna and Vishnupuri projects.

As we know, in Maharashtra large scale

development of large scale irrigation projects have taken place, since its formation in 1960, even prior to that the British rulers have taken up the irrigation works for control of Scarcity of water for Eg Bhatghar dam for Scarcity area of Pandharpur and Sangola talukas of Solapur district. The canals were from the dam to reduce to severity of draught by 1920. The Bhatghar dam was constructed during the period of 1924 to 1928. The other examples are the Visapur tank near Shrigonda district Ahmadnagar, the Bhatghar dam for Ahmadnagar and adjacent area and so on.

The following table shows the details of Major Irrigation projects in Maharashtra

Table No. 2.1
Major Irrigation projects in Maharashtra
(Area in Ha.)

Name of the Project	Benefited Area (In Ha.)	Started year of the Project	Completed year of the project
Bugh	33671	1938	1972
Bhima	130846	1969	1980
Ghod	24615	1954	1965
Gima	57208	1958	1967
Itodoh	46136	1958	1966
Jayakwadi - I	141615	1964	1966
Khadkwasla - I	22298	1957	1966
Krishna	106290	1968	1980
Kukadi stage - I	42700	1969	1980
Purna	61514	1957	1968
Upper Godawari	41682	1968	1966
Veer	26710	1957	1965
Wama	99058	1967	1976

Source :- Dams in Maharashtra Irrigation Department year 2000.

There are many other major irrigation projects in Maharashtra. The details are as follows

- 1) Kukadi Irrigation Projects :- Nearly 1,56,278 Hectares land (cropland) in Pune, Solapur, and Ahamadnagar districts is under irrigation. The following table shows the details of taluka wise irrigated area in Pune, Solapur, and Ahmadnagar districts.

There are five dams in Kukadi Irrigation project namely -

- A) Vadaj
- B) Yedgaon
- C) Dimbhe
- D) Manikdoh and
- E) Pimpalgaojoge.

2) Krishna Irrigation Project :-

Under this project there are three dams namely (a) Dhom dam (b) Kanher dam and (c) Borkhal dam. The following table shows the details of this project.

Table No 2.2
Krishna Irrigation Project

Dams	Distict	River	Catchments Area(sq.km)	Total waterreservoir (TMC)	Useble water reservoir (TMC)
Dhom Dam	Satara	Krishna	217.56	382.32	331.01
Kanher Dam	Satara	Varu	204.69	286.00	271.68

Source :- Dams in Maharashtra Irrigation Department year 2000.

3) Surya Irrigation Project :-

Surya Irrigation project in Javar taluka, district Thane is a major irrigation project on Surya river. There are two dams-namely Dhamni and Kavadas dam. The following table No.2.3 gives us the details of the Surya project.

Table No 2.3
Surya Irrigation Project

Dams	District	River	Catchments Area-(sq.km)	Total water reservoir (TMC)	Usable water reservoir (TMC)
Dhamsi Dam	Thane	Surya	203.30	326.59	276.35
Kavayats Dam	Thane	Surya	152.30	247.54	109.96

Source – Dams in Maharashtra Irrigation Department year 2000.

4) Mula-Mutha Irrigation Project:-

This project is situated in Rahari taluka, Ahamadnager district. The following table No 2.10 gives us the detail of this project.

Table 2.4
Mula-Mutha Irrigation Project

Dams	District	River	Catchments Area-(sq.km)	Total water reservoir (TMC)	Usable water reservoir (TMC)
Mula project	Ahamadnager / Rahar	Mula	2275.86	735.80	608.45

Source: - Dam in Maharashtra Irrigation Department year 2000.

5) Nira Deoghar Irrigation Project: -

This project is situated in Pune District. The following table Shows features of the project.

Table No. 2.5
Nira Deoghar Project

Dams	District	River	Catchments Area-(sq.km)	Total water reservoir (TMC)	Usable water reservoir (TMC)
Nira	Pune / Bhor	Nira	114.48	537.39	322.13

Source: - Dams in Maharashtra Irrigation Department year 2000.

6) Chaskaman Irrigation Project: -

This project situated in Bibi village taluka Khed, district Pune. The following table Shows the details of this project.

Table No. 2.6
Chaskaman Irrigation Project

Dams	District	River	Catchments Area-(sq.km)	Total water reservoir (TMC)	Usable water reservoir (TMC)
Chaskaman Dam	Pune / Khed	Bhims	305.56	348.09	81.34

Source: - Dams in Maharashtra Irrigation Department year 2000.

7) Pench irrigation Project: -

Pench Irrigation project situated in Godawari Valley- district Nagpur, the following table gives us the details of this Project.

Table No. 2.7
Pench Irrigation Project

Dams	District	River	Catchments Area-(sq.km)	Total water reservoir (TMC)	Usable water reservoir (TMC)
Pench	Nagpur/ Parshivani	Pench- Godavari	4661	965	935

Source: - Dams in Maharashtra Irrigation Department year 2000.

2.4 Maharashtra State Water Policy.

The National Water Policy has been revised in 2002, federal government directed states to formulated water policy of stated. The state has prepared state policy encompassing state water scenario, challenges, strategies, approaches etc. the Maharashtra state is among first few state to have its own water policy. The policy has been framed considering diverse

needs of different part of the state, as state rainfall varies from 400 mm to 6000 mm as mentioned earlier. The policy emphasizes on Integrated Water Resources Management (IWRM). The need for watershed management, ground water management is also stressed.

The policy advocates river basin management. It also duly addresses drought management and measures to mitigate it. The use of new technology is encouraged in water resources management. The policy has innovative features such as water auditing, benchmarking of water resources project water entitlement etc. The state water policy is good example of visionary and down to earth approach.

The total cultivated area in Maharashtra increased from 188.23 lakh hectares to 209.42 lakh hectares during the period 1960-61 to 1992-93. During the same period the area under irrigation increased from 12.20 lakh hectares to 26.46 lakh hectares. This the percentage of irrigated area to the total cultivated area increased from 6.5% to 13.1% during the same period. The net irrigation area in Maharashtra increased upto 25.49 lakh hectares in 1996.

The state of Maharashtra is having more than 13.1% of irrigation area. This is due to the fact that there is not a single big river in Maharashtra. As a result of geographical constraints, the numbers of major irrigation projects are very few in comparison with national level. Maharashtra is not having many potentialities for irrigation development; this is because of following major factors -

- 1) Maharashtra is not having big rivers, expect few flowing throughout the year
- 2) In Maharashtra the drought prone areas are far away from the irrigation projects. The result is high irrigation cost.
- 3) The land in Maharashtra is composed of basalt or hard rock, which does not permit percolation of water.

As s part of policy, the state have sought to achieve multiple objectives of providing relief by way of irrigation water to the drought prone areas, by providing extra outlays fort the removal of regional imbalance, to utilize the state share of water the Maharashtra Krishna Valley Development Corporation has been established in January 1996. to accelerate the progress of irrigation projects in Vidarbha region, government of Maharashtra has established the Vidarbha Irrigation Development Corporation in March 1997, similarly Konkan Irrigation Development Corporation in December 1997, the Tapi irrigation Development Corporation in December 1997 and the Godavari Marathwada Irrigation Development Corporation have also been established in April 1998. the state government also given priority to maximize the flow of irrigation potential from Minor Irrigation Project as these have short gestation period and can help to remove the backlog in the irrigationally backward areas.

Objectives of Maharashtra State Water Policy (MSWP)

The objectives of the Maharashtra State Water Policy are to ensure the sustainable development and optimal use and management of the State's water resources to provide the greatest economic and social benefit for the people of Maharashtra in a manner that maintains important ecological values within river and adjoining lands.

Integrated, Multi-sectoral and River Basin Approach To adopt an integrated and multi-sectoral approach to the water resources planning, and management on a sustainable basis taking river basin/sub-basin as unit.

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 water with unitary approach. The management of the water resources of the state shall be decentralized to the lowest practicable level on the basis of hydrologic of watershed units. The State shall be divided into 5 river basin drainages and appropriate river basin agencies shall be established within each river basin. Water resources development corporations shall be established within each river basin. The river basin agencies shall have the responsibilities and authority for the integrated planning development, and management of the water resources and watersheds of their respective river basins; for flood management, drought management and operation and maintenance water storage and delivery infrastructure. These river basin agencies shall prepare integrated river basin plans with the effective inclusion of participation of representatives of all basin water user entities, categories of water users and other stake holders. Such basin plans monitoring plan, a comprehensive watershed management plan, an efficiency improvement and water conservation plan and a waste minimization and water quality management plan.

State Water Plan

Based on the water resources development and management plan developed by the respective river basin agencies, the shall prepare a State water resources plan to promote a balanced development and by proper coordination among diverse water uses which shall include structural measures, operational measures, watershed management measures, demand management measures such as conservation, scarcity and scheduling and efficient technologies, water pollution control measures and monitoring measures that will assure comprehensive sustainable management of the water resources and equality of water distribution for the benefit of the State and its peoples.

Water Resources of the States

The water resources of the State shall be defined as all waters— surface or sub-surface – arising within the State or passing through the State in any all drainages and aquifers within the state.

The geographical area of the state is 308 lakh ha and cultivable area is 225 lakh ha. Out of this, 40% of the area is drought prone. About 7% area is flood prone. The highly variable rainfall in Maharashtra ranging from 400 to 6000 mm occurs in a 4 months period between June-September with the number of rainy days varying between 40 and 100. The estimated average annual availability of water resources consists of 164 km³ of subsurface water and 20.5 km³ of subsurface. Of the 5 river basin systems, only 58% of this average annual availability is found in the four major river basins (Krishna, Godavari, Tapi, Narmada) east of the western Ghats. These four river basins comprise 92 % of the cultivable land and 75 % of the people living in rural settlement and fast growing towns and industrial area. An estimated 49% of the area of these river basins containing 43% of the population is already considered deficit or highly in regard to water availability; and this deficit areas are expected to increase and the economics growth take place. Moreover Maharashtra shares all these four river basin with neighbouring states, and various interstate river water tribunal awards/agreement, decisions on water sharing have

reduced estimated available surface water resources in these river basins for the state of Maharashtra to about 125km³.

Water Users' Participation in Planning, Development and Management of Water Resources

Water users, through their legally recognized organizations or service providers, shall have increased responsibility and be empowered to participate effectively in water resources planning and development, the operation and maintenance of water infrastructure and facilities and to manage their entitlement to water.

Farmers' Management of Irrigation Systems

Farmers' participation in irrigation management should be made mandatory and water will be supplied on volumetric basis to water users' associations (WUAs) only. The irrigation system shall be managed through WUAs as per provisions made in the appropriate act. The women's participation in the irrigation management should also be considered. These WUAs will hold a bulk entitlement to water use on behalf their members; and water will be allocated, delivered and charged to WUAs on a volumetric basis. WUAs will manage and distribute their bulk entitlement and Maintain all irrigation infrastructures within their jurisdiction. In case of ex-malgujari tank, the agreement system on irrigation scheme in vidharbha region and the block system on three pre-independent projects (Neera, Pravara and Godavari) beneficiary farmer will be entitled for the water quota in their WUAs as practice of block/agreement system and it will be made obligatory to WUAs to observe accordingly. WUAs will be federated at the distributary's and project levels. These federations will be responsible for operation and maintenance of their respective canals and appurtenant structure and facilities.

Water for Domestic and Industrial Use

Adequate domestic water facilities shall be provided to the entire population both urban and in the rural areas to meet its domestic needs. Multipurpose projects shall invariably include a domestic water component wherever there is no alternative and adequate source of drinking water. Drinking water needs of human beings and animals shall be the first priority on any available water.

A perspective plan to meet domestic water requirement shall be prepared and steps taken to provide adequate resources for this purpose in a phased manner. Efforts shall be made to take water directly from reservoir. As far as possible, dedicated pipeline for avoiding loss of water through canal or river should be laid for getting supply of drinking water preferably from reservoir. Efforts shall be made to make the water supplies self-sustaining at least to meet the O&M costs considering the socio-economic conditions of the population to be served. It shall be made obligatory for newly coming up industries to set up effluent treatment plants either collectively or individually. Effluent treatment plants installations shall be made in stages (within 5-7 years) for existing industries as well as for civic water supply schemes. Encouragement will be given for recycling or reuse of treated wastewater.

Community Management of Drinking Water Supply and Sanitation

The community will be effectively involved in the planning and management of drinking water supply and sanitation facilities in the urban as well as rural areas. Community level organization and appropriate local level bodies / community organization shall manage, operate and maintain these services on day to day basis.

Participation of the Private Sector

In each river basin, the full and effective participation of private industrialists and commercial enterprises and water services providers will be sought and encouraged in the preparation of river basin plans and in the sustainable management of basin water resources. The participation of the private sector, in partnership with the Government or other competent authority in the financing and implementation of water projects will be encouraged and where appropriate in order to introduce new technology and innovative financing, obtain management expertise, improve the quality and cost-effectiveness of water services and accountability to water users.

Water Quality

The quality of the water resource of the state shall be protected to preserve their usability in a sustainable manner for the people and the state. The state shall establish a program of control of discharge of any pollutants to the surface and sub-surface waters of the state including the ocean, bays and saltwater marshes of the state. This program shall include the registration of any such discharge. The licensing and monitoring of such discharges and the establishment of standards for the water of the state and acceptable and appropriate limit for any discharge of pollutants into these waters. The river basin agencies shall consider the maintenance of water quality in the preparation of water basin plans, operations plans and watershed development plans. The pollution of the water resources of the state will be prohibited and those polluting, contributing to the pollution or abetting the pollution of the water resource of the state shall be penalized as providing in the laws and the regulations of the state through its relevant state agencies.

Monitoring and information systems :-

Reliable and appropriate data and information is essential for effective management of water resources. A modern intergraded monitoring network for hydro-meteorological and related water resources and water use data and a shared data and information management system shall be established and sustained to support planning, project formulation and implementation, operations and decision making by the river basin agencies, all water users and water service providers and state departments and other agencies at the river basin, sub-basin and state levels. All state agencies departments and all entities – public or private – that collect, maintain, collate or archive hydro-meteorological and related water resources and water use data shall contributed data to this information system after ensuring its validity and accuracy full access to the data in this information system shall be ensured for all water users and stake holders – public or private and for concerned state

agencies and departments.

Benchmarking of Water Resources Projects

The performance of water resources projects and service delivery through these projects for various water user sub-sectors can be improved by increasing the efficiency transparency and accountability of the personnel for providing services and seeking participation of users. Benchmarking a very powerful management tool for analysing and improving performance of water resources projects. Therefore the Government of Maharashtra will undertake the benchmarking exercise in all the projects in the state in a phased manner in such a way that all projects are covered under benchmarking exercising a period of about five years.

Water Audit

For increasing utilisation of available potential, water audit is necessary. Water audit will be compulsory for all water resource projects. The service providers shall be accountable for providing measuring devices for volumetric supply and for giving the account of water use in various sectors.

Conservation of Water

The efficiency of utilisation in all the diverse uses of water shall be improved and an awareness of water as a scare resources shall be fostered. Conservation consciousness shall be promoted through education, regulation, incentives and disincentives.

Water harvesting shall be given consideration in planning water resources. Viable projects especially in scares ground water areas shall be investigated and implemented to increase the surface water availability, which would also help in recharging the groundwater.

Recycling and reuse of water have to be attempted for augmentation of water resources. This will include reclaiming useable from sewage after necessary effluent treatment. This should be made mandatory for industries use. Measures to control the evaporation for the water bodies is taken up and efforts made to make the process more cost-effective. Programme of water literacy should be launched right from primary school level so as to create awareness about the importance of economizing the use of water amount the diverse users. The water conversation works shall be taken on top priority were groundwater table has considerably gone down and the Central Government has declared the area as dark zone.

The water conversation works (village tanks, percolation tanks and K.T.weirs), in the command area of the completed major and medium projects shall be taken as per the requirement were water supply is inadequate and irregular for irrigation purpose.

Drought Management

Drought-prone areas shall be made less vulnerable to drought-associated problems through soil-moisture conversation measures (farm tanks, nalla training, percolation tanks, K.T.weirs), water harvesting practices, minimization of evaporation losses, development of the ground water potential including recharging and the transfer

of surface water from surplus areas were feasible and appropriate.

Pastures, forestry or other modes of development which are relatively less water-demanding shall be encouraged. In planning water resources development projects, the needs of drought-prone areas shall be given priority. Dependability of projects be lowered subject to economic viability. Modern irrigation systems such as drip and sprinkler irrigation be encouraged. In planning and regulation of irrigation projects, eight-monthly cropping adopted. 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. The norms of supply of water for domestic use shall be different for different river sub-basins of the State depending upon the water availability statuses of the areas concerned. Relief works undertaken for providing employments to drought-stricken populations shall preferably be for drought proofing. Water resources development works shall be given top priority.

2.5 Water Resources in Maharashtra.

In the year 1962, the State Irrigation Commission made a comprehensive study of irrigation development and management. The Irrigation Commission had assessed that the ultimate irrigation potential both from the surface and underground sources would be about 7.08 million hectares out of which 5.26 million ha. (5.9 million ha as per revised estimate) would be from the surface sources and 1.80 million ha from under ground sources. Information about 75% dependable yield different basins and permissible water use (according to award of tribunal) is tabulated as :

Table No. 2.8
Basewise Water Resources in Maharashtra.

Name of the Basin	Geographical area in million ha	Cultivable area in million ha	75% dependable yield Mcum	Permissible use (As per tribunal award) Mcum
Godavari	15.43	11.256	3700	3485
Tapi	5.12	3.731	697	545
Narmada	0.16	0.064	315	308
Krishna	7.01	5.627	2871	16818
West Flowing Rivers	3.16	1.864	5899	6910
Total	30.88	22.542	131562	125936

Source :- Water Resources in Maharashtra year- 2004.

The Irrigation Department of Government of Maharashtra has a glorious history of Irrigation over last 150 years. The State of Maharashtra came into existence in the year 1960 after bifurcation of old Bombay State into Maharashtra and Gujrat. In the year 1960, the Public Works Department was divided into Irrigation Department and Building and Communication Department. The Irrigation Department is mainly entrusted with the work of Investigation, Planning, Design, Construction and maintenance of Multipurpose Dams Canals and canal structures & Lift Irrigation schemes.

Add Dams Photo
2.7 Rainfall and climate

The rainfall in the state varies from 400 to 6000 mm. The average rainfall for the state as a whole is 1067 mm, and the major portion of the rainfall is received during the monsoon (June to September). The topography of the land in the State is also uneven with steep ground slopes due to which narrow strips of land on both banks of the river were commanded resulting in longer canals. The need for storage in the areas with heavy rainfall and conveyance of water

through canals in uneven terrains to irrigate areas with deficient rainfall. renders the irrigation works in the state costlier than those in north India. Maharashtra State, has a tropical climate. The annual rainfall varies from 400 mm to 6000 mm. Summer, Rain season and winter these are three distinct seasons in Maharashtra. It rains from both South West and North East monsoon. About 85% rainfall is from the south-west. The monsoon is confined to only 3 to 4 months of the year. The number of rainy days generally vary from 40 in the scarcity zone to 100 in the heavy rainfall zone. The average annual rainfall is around 1300 mm.

Table No. 2.9
Average Annual Rainfall & Average Annual Temperature in Maharashtra.

Average Annual Rainfall (in mm)	Average Annual Temperature (in Celsius)
4000 - 8000	1000 - 1200
2000 - 4000	800 - 1000
1600 - 2000	600 - 800
1200 - 1600	0 - 600
	Less than 20.00

Sources :- Agricultural census Report in Maharashtra 2001.

2.8 Irrigation Development Corporations

In order to accelerate the completion of irrigation projects in Maharashtra State, the Government has established five Irrigation Development Corporations in the State. All the Corporations are headed by the officers of the rank of Secretary to Govt. and designated as Executive Directors. These corporations were allowed to raise funds through open market in the initial period. Now a centralized procedure is followed for funding the construction activities of the Corporations through Maharashtra Irrigation Finance Corporation (MIFC). The projects not covered by Corporation jurisdiction rest with Water Resources Department of Government of Maharashtra.

Maharashtra Krishna Valley Development Corporation (MKVDC)

MKVDC is responsible for survey, Planning, Design, Construction and Management of Major, Medium and Minor Irrigation Projects in Krishna Basin.

Godavari Marathwada Irrigation Development Corporation (GMIDC)

GMIDC is responsible for survey, Planning, Design, Construction and Management of Major, Medium and Minor Irrigation Projects in Godavari Basin.

Vidarbha Irrigation Development Corporation (VIDC)

VIDC is responsible for survey, Planning, Design, Construction and Management of major, Medium and Minor Irrigation Projects in Vidarbha Region.

Tapi Irrigation Development Corporation (TIDC)

TIDC is responsible for survey, Planning, Design, Construction and Management of Major, Medium and Minor Irrigation Projects in Tapi Basin.

Konkan Irrigation Development Corporation (KIDC)

KIDC is responsible for survey, Planning, Design, Construction and Management of some Major, Medium and Minor Irrigation Projects in Konkan Region.

2.9 Organizational Structure of Irrigation Management In Maharashtra.

And District Level Implementation Committee On Irrigation

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