Chapter No V
AGRICULTURAL FACILITY

Introduction
5.1 Irrigation
5.2 Sources of Irrigation
   5.2.1 Canal Irrigation
      5.2.1.1 Nilwande Canal
         5.2.1.1.1 Characteristics of Canal
   5.2.2 Dam Irrigation
      5.2.2.1 Bhandardara Dam
         5.2.2.1.1 Characteristics of Dam
      5.2.2.2 Nilwande Dam
         5.2.2.2.1 Characteristics of Dam
      5.2.2.3 Adhala Dam
         5.2.2.3.1 Characteristics of Dam
   5.2.3 River Irrigation
      5.2.3.1 The Mula River System
      5.2.3.2 The Pravara River System
      5.2.3.3 The Adhala River System
   5.2.4 Well and Tube-well Irrigation
   5.2.5 Tank Irrigation
      5.2.5.1 Existing Tank Irrigation Project
   5.2.6 Lift Irrigation
      5.2.6.1 Existing K T Weirs Project
   5.2.7 Other Irrigation
      5.2.7.1 Sprinkler irrigation
      5.2.7.2 Drip irrigation
5.3 Electrical Facilities
5.4 Chemical, Fertilizers and Pesticides
5.5 Machinery
5.6 Resume
5.7 References
Chapter V

AGRICULTURAL FACILITY

Introduction:

Water is necessary for the very existence of man who appeared on the earth in early Pleistocene Two to Three Million years ago. However, due to rapid growth of population and increased needs for agricultural and industries, water is many areas a critical factor. A large body of following water constrained in a channel may be defined as river. The term river is used for the main trunk of a drainage system.

Water has been prioritized to be the most crucial resource. Agricultural uses almost 85 percent of the total water available in the country. By 2020 we would need about 29 percent more water for agriculture whereas water availability is likely to be reduced by 12 percent. Therefore, not only sustainable development of potential sources of water, but also to augment, conserve and manage these resources through improvement in water storage, conveyance, application and crop-water-use efficiencies, without detriment to environment and natural resource base is imperative, hence enhanced effort and support is needed. Next to water, nutrients are an important input for guiding sustainable growth of agriculture.3

5.1 Irrigation:

Irrigation is the artificial application of water to partially meet the crop evapo transpiration requirements. It is essential for sustaining crop productivity in many regions of the country, mainly because of the rainfall is inadequate and unevenly distributed to meet crop-water demands. The traditional methods of irrigation such as flooding check basin and border irrigation results in poor conveyance and porous soils. Hence, efficient water application methods such as furrow, sprinkler and drip irrigations needed to be recommend to minimize wastage of stored water and to bring more area under command.3
Irrigation is a method by which water is supplied to plants from the outside or the artificial source of water where natural precipitation falls short. Irrigation is indispensable to Indian agriculture. Agriculture needs a regular supply of water by irrigation. Various methods of irrigation e.g. Wells and Tube-wells irrigation, Tank irrigation, Canal irrigation, Inundation canals (River during flood), Perennial canals (All the year round, river).

Normally, groundwater and surface water are used for irrigation and when available water in these sources is taken away by artificial means to supply for the crops, it is called irrigation. Ground water has emerged as the prime source of drinking and irrigation. More than 90 percent, present ground water withdrawal is being used for irrigation purpose thus, contributing largely in food security of the study area. Various types of irrigation techniques different in now, the water obtained from the source is distributed within the study area. In general, the goal is to supply water to the entire field uniformly, so that each plant will get sufficient water, neither too much nor too little.

i. **Surface Methods:**

Surface irrigation can be subdivided into furrow, border strip or basin irrigation. It is often called flood irrigation when the irrigation results in flooding or near flooding of the cultivated land. Historically, this has been the most common method of irrigating agricultural land. Where water levels from the irrigation source permit, the levels are controlled by dikes, usually plugged by soil. This is often seen
in terraced rice fields (rice paddies), where the method is used to flood or control the level of water in each distinct field. In some cases, the water is pumped, or lifted by human or animal power to the level of the land.  

ii. **Pressurized Irrigation Systems (Localized Irrigation):**  

Localized irrigation is a system where water is distributed under low pressure through a piped network, in a pre-determined pattern and applied as a small discharge to each plant or adjacent to it. Drip irrigation, spray or micro-sprinkler irrigation and bubbler irrigation belong to this category of irrigation methods.  

5.2 **Sources of Irrigation:**  

The sources of irrigation are greatly affected by the geological, physical and climatologically conditions.\(^1\) Irrigation is available from various sources. The important sources of available in the irrigation shows in the Tahasil are canals, dams, rivers, wells, tube wells, tanks, lifts and other [Irrigation Maps  5.1 (I and II)]. Shows the sources of irrigation in the study area.
5.2.1 Sources of Irrigation in the study area:
5.2.1.1 Sources of Irrigation in the study area

Map No. 5.1(II)
At present the **Dam irrigation** system is confined only to the north east (Adhala dam) and central part (Bhandardara and Nilwande dam), the **River, Well and Tubewell irrigation** is widespread to the north (Mhalungi and Adhala river basin), central part (Pravara river basin) and south part (Mula river basin), **Tank irrigation** is to the north central and south part, the preponderance of **lift irrigation** is Mula river basin in the tahasil map no. 5.1 (I and II). The analysis of these sources exhibits variations at tahasil level as follows:

### 5.2.2 Canal Irrigation:

It is an important source of irrigation in central east part of the tahasil in which water is utilized by gravity flow. Recently, the Nilwande canal is in process. The work is in progress on the Nilwande dam. It requires almost plane topography having lesser degree of slopes. But in these uncertainly slope region, so higher step of pipe canal project use of irrigation in the command area.

#### 5.2.2.1 Nilwande Canal:

The Nilwande canal system constructed through Upper Pravara Project (Nilwande-II) in the study area is in process at work. This is the main canal on Pravara River, Its total length is of 182 km passing through Sangamner, Rahuri and Rahata tahasil. After completion of the work this canal system will provide irrigation facilities to central east part of the study area and will be irrigates about 2,328 hectares land. The drainage areas of Nilwande canal divided into two branches i.e. left and right bank high level of pipe canal.

Canal system is developed according to the slope. If ground level is plain, canal would be constructed. Similarly, slope of ground level also affects irrigation development along with agricultural. In the command areas of 9 villages (Bahirwadi, Dhokari, Gardani, Tambhol, Ambad, Dhamangaon Awari, Pansarwadi, Parkhatpur and Vashere) which is physiographically hilly region. So, construction is not a open canal system. There is use of suitable method in high level of pipe system. This canal system is a plan or scheme for drought prone region, water conservation and development of other
tahasils. Two main branches of Nilwande canal i.e. high level of Left bank pipe canal and second high level of Right bank pipe canal system Map no. 5.1 (I and II).

Originally this canal project was estimated to cost about Rs. 8567.38 lacs (Infrastructure and project work cost 8023.38 lacs, obtain of land and etc. work cost 544 lacs) and the fifty percent work completion of the project. This project is used is to store water in Nilwande dam and used for irrigation benefits of Akole, Sangamner, Rahuri and Rahata tahasil in Ahmednagar district. Production of crops needs more water and is also possible through canals. As compared to un-irrigated soils, higher productivity per hectare is also possible due to canals. The canal is most important for command area constructed for public use but in future, creating various problems in distribution of water in the catchment of area.

5.2.2.1.1 Characteristics of Canal:

1. High level Left bank pipe canal water supply on 1.165 qumex, 41.15 qucex less than 2706 meters and 0.448 qumex, 15.82 qucex above 2706 meters.
2. High level Right bank pipe canal water supply on 0.710 qumex, 25.33 qucex.
3. Length of left pipe canal 20680 meters (MS pipe 18100, gauge of pipe 1.50 meters to 0.55 meters).
4. Length of right pipe canal 19370 meters (MS pipe 16660, gauge of pipe 1.20 meters to 0.55 meters).
5. Sub minor left bank pipe canals 9135 meters 5 sub minor in upper division and 275 hectare command area pvc pipe gauge in 180 to 400 mm and 9 sub minor in lower division and 596 hectare command area pvc pipe gauge in 110 to 315 mm.(41.05 qumex and 1450 qucex).
6. Sub minor right bank pipe canals 16825 meters 8 sub minor in upper division and 475 hectare command area pvc pipe gauge in 160 to 450 mm and 10 sub minor in lower division and 982 hectare command area pvc pipe gauge in 110 to 315 mm. (14.38 qumex and 508 qucex).
5.2.3 Dam Irrigation:

In the western part of study area Bhandardara (Wilson, 1926) and middle part of Nilwande (Upper Pravara-II, 2011) is the major dams and north eastern part of Adhala (1976) medium dam is constructed. These dams are main sources of irrigation system.

5.2.3.1 Bhandardara Dam:

The dam of Bhandardara was built during British period by Sir Arthur Wilson, Chief Engineer (British Empire in India). So, it’s also known as ‘Wilson Dam’. The dam is famous for natural scenery and is a very attractive destination in the state of Maharashtra. In 1907 British conducted a survey of the area for irrigation which is under this dam. The project was sanctioned in August 1907 and completed on 3 April 1910. The capacity of this dam was further increased in the year 1921 and its irrigation is extended up to Shrirampur tahasil. In 1925 a supporting wall was erected to increase the capacity of the reservoir. The dam capacity is considered to full when the water in the dam overflows from the staircases of Hanuman Temple at Ratanwadi (Map 5.1-I and II).

Bhandardara dam is constructed on Pravara River 10 km away from Randha fall and 21 km away from Rajur and located between $19^0 5^\prime$ north latitude and $73^0 11^\prime$ east longitudes. The dam is built between Kalsubai Mountain range to the north and Baleshwar mountain range to the south. Average height of the area is between 900 to 1050 meters. This is natural dam (surrounded by hills) and it receives heavy rainfall (average of 508.9mm) during rainy season.
5.2.3.1.1 Catchment Area of Bhandardara Dam:

Map No. 5.2  (Source: Irrigation Dept. Ahmednagar)
5.2.3.1.2 Characteristics of Dam:

1. Bhandardara Dam rank Second after Mula Dam in Ahmednagar district. Storage capacity of the dam is 11.039 TMC (use of-10739 mcm and unuse of-306 mcm storage water).

2. Located at midst in the mountain ranges from three sides (i.e Noth direction- Kalsubai Mountains range, South-Baleshwar mountains range and West-Mountain range of-Ratangarh).

3. Height of Wall of this dam is 82.32 meter and length is 507 meter.

4. It irrigates approximately 1, 82,000 hectares of land (catchment area-120.32sq.k.m).

5. Length of dam-506.16 meters, wall-16.84 meters and Diverge in villages-100.

6. Two canal system of the dam (Total length 131 km) are: Left canal (length of-77 km) and Right canal (length of-54 km).

7. Total GCA – 89491 hectares.
   Total CCA – 63027 hectares.
   Total ICA – 33066 hectares.
   Actual cropped area – 33077 hectares.

8. Dam provides water for irrigation in Sangamner-18%, Akole-12%, Shrirampur and Rahata-52%, Rahuri-15%, and Newasa tahasil-3%.6

9. The dam is mainly for irrigation purpose and (40 villages study area) supply water for different crops, under these dam 3 sugar factories, 4 Paper mills and 1 cotton mill.

10. The dam in multipurpose project-irrigation and Hydro-electric power generation is being done.

11. Surrounding area of the dam receive heavy rain fall nearly up to 210 cm per year.

12. North direction of hill reflected water which is called as Umbrella fall.6

5.2.3.2 Nilwande Dam:

This dam is also known as ‘Upper Pravara Project’. The project was sanctioned in 1993, 80 percent work completed on 2011 and remaining work is progress. It is estimated to store (3856 hectares) 236.01 MCM of water. In the dam capacity is considered to full when the water in the Bhandardara dam overflows Map no. 5.1 (I and II) and Fig. no.2. It is constructed on Pravara River in the village Nilwande. Geographically Nilwande is
located between $19^0\,32'\,45''$ North Latitude and $73^0\,54'\,15''$ East Longitudes. Originally this project was estimated to cost about Rs. 793.31 lacs in 1970. In the 1977 sanction of estimated to cost Rs. 1586.73 lacs. Secondly, cost of sanction Rs. 23440.64 lacs in 1972. The latest estimated cost of the project is Rs. 76021.01 lacs in 2003 and the potential of 1, 11,090 hectares total (GCA) area would be created on completion of the project. The project will benefit in Akole, Sangamner, Rahuri and Rahata tahasil of Ahmednagar district.

5.2.3.2.1 Characteristics of Nilwande Dam:

1. Catchment area - 202.21 sq.km and Irrigated area-802.00 hectares.
2. Total 2 villages are 100 percent capture of water and 12 villages are 50 percent capture of water (use of-228.75 MCM and unuse of 7.25 MCM storage water).
3. Diverge of people - 655 families.
4. Length of dam - 533 meters and wall - 72 meters.
5. Use of water in 75 percent confidentially – 269.14 MCM and Unirrigated use of water-10.56 MCM.
6. Evaporation (Yearly) – 12.60 MCM.
7. Total GCA – 111090 hectares.
   Total CCA – 86100 hectares.
   Total ICA – 64260 hectares.
8. Two canal system of the dam (Total length-182 km) are; Left canal (length-85 km) and Right canal (length-97 km).
5.2.3.2.2 Catchment Area of Nilwande Dam:

Map No. 5.3 (Source: Irrigation Dept. Ahmednagar)
5.2.3.3 Adhala Dam:

It is a medium storage dam, constructed on Adhala river in the village Devthan. Geographically Aadhala is located between 19° 38’ 28” North Latitude and 73° 02’ 03” East Longitudes. The dam capacity is 30.01 MCM and actual storage water 27.61 MCM. Use of sanction water 35.61 MCM and under drip irrigation area is 547.96 hectare Map no. 5.1 (I and II) and Fig. no. 3. The project (dam and canal) was sanctioned in 1968 and completed total work in 1975-76. Originally this project was estimated to cost about Rs. 197 lacs in 1966. The latest estimated cost of the project is Rs. 263 lacs in 1977. The project will benefit in north eastern part of the study area and north western part of the Sangamner Tahasil of Ahmednagar district.

5.2.3.3.1 Characteristics of Dam:

1. Three watercourses i.e. Distributary No. 1 (10 km), Distributary No. 2 (5.19 km) and Distributary No. 3 (4.50 km).
2. Lift irrigation - 305 hectares.
3. Drip irrigation - 547.96 hectares.
4. Catchment area - 177.11 sq.km and Irrigated area- 230.97 hectares.
5. Length of dam - 1006 meters and wall-144.78 meters.
6. Storage capacity of the dam is 1060 MCM (use of - 975 MCM, unuse of - 85 MCM storage water and 0.56 MCM reserve drinking water).
7. Evaporation (Yearly) - 3.12 MCM.
8. Total GCA – 8161 hectares.
   Total CCA – 6427 hectares.
   Total ICA – 3914 hectares.
   Actual cropped area – 5753 hectares.
9. Two canal system of the dam (Total length-20.63 km) are Left canal (length-8.83 km) and Right canal (length-11.80 km).
10. District wise cropped area i.e. Ahmednagar-5468 hectares and Nashik-185 hectares.
11. The dam is mainly for irrigation purpose and supply water for different crops.
5.2.3.3.2 Catchment Area of Dam:

Map No. 5.4  (Source: Irrigation Dept. Ahmednagar)
5.2.4 River Irrigation:

The study area is drained by three important rivers the Adhala, Pravara and the Mula and their tributaries. The watershed between these being the Sahyadries range. This region receives maximum rainfall during the rainy season. The Balaghat ranges are flat-topped and regular in height Kalsubai is the highest peak of the ghats in the state, lies in the Godavari basin, just 30 kms. The Baleshwar range lying south of the Balaghat range is the water divide between the Bhima and Godavari basin Map 5.1-I and II.

5.2.4.1 The Mula River System:

The Mula river rise on the eastern slopes of the Sahyadri between Ratangarh and Harishchandragarh. For first 20 miles, it flows parallel to Pravara upto the southernmost or Kotul valley of Akole subdivision. Passing the town of Kotul, it takes a bend to Baleshwar. Then it passes through Sangamner and Parner. The Mula dam is constructed across the river at Baragaon-Nandur. Total catchment area of River Mula in the study area is 1889 hectares. In this catchment Kurkunde, Ghoti, Bori-Nala, etc. tributaries join River Mula.

5.2.4.2 The Pravara River System:

The Pravara is an important tributary of the river Godavari. Water of the river Pravara fall from a great height, creating the Randha fall. The Pravara origin in the Balaghat hills near Bhandardara, in the eastern slopes of the Sahyadri between Kulang and Ratangarh. After the sinuous course of 12 Miles in an easterly direction, near the village Ranad, it fall into rocky chasm 200 feet deep and then flows for eight miles through a deep narrow glen which opens wider valley east of and below the central plateau on which the town of Rajur located. Total length of River Pravara in the study area is 120 miles. It has a length of about 200 kms within the district and meets the Godavari at village Toka in Newasa tahasil. The Mula, Adhala and the Mhalungi are important tributaries of the Pravara River.

The Wilson dam (Bhandardara) is constructed across the river at Bhandardara, nearby the Randha fall. Total catchment area of Pravara River in the study area is 3681 hectares. In this catchment Krishnwanti, Musha etc. tributaries join river Pravara. The height of the dam above the deepest part of the riverbed is 90 meters.
5.2.4.3 The Adhala River System:

The Adhala river rises in northern side of study area on the slopes of Patta and Mahakali. It flows for 15 miles in easterly direction between two ranges of hills which encloses the Samsherpur Valley, then falling into the rocky chasm some 150 feet deep it ws between rugged and precipitous hill-sides for couple of miles, when, debouching in to the flows plain of Sangamner, it turns south and falls into the Pravara 3 miles west of the town of Sangamner. Total catchment area of Adhala River in the study area is 3914 hectares.

5.2.5 Well and Tube-well Irrigation:

Well irrigation is an indigenous method, largely suitable for individual farmer wherein water is lifted by a ‘Mote’, worked out by a pair of bullocks. Nowadays, these ‘Motes’ are replaced by oil engines and electric motors. As there is no steady water table, the tube wells are neither successful nor economically feasible in the region. The physical setting of the wells and tube wells in general is governed by the surface topography and also by the behavior of ground water. Well and tube well irrigation is fairly well developed in the tahasil. The main well and tube well irrigated areas lie in the Mula, Pravara and Adhala river basin. There are as many as 6321(5887- electric pump and oil engine) wells and more than 22,000 tube wells in the tahasil. These source accounts for more than half the area under irrigation. The entire sugarcane, wheat, vegetables, flower and fodder crops area is under irrigation and that too mostly under well and tube wells.

Well irrigation is an indigenous method. Largely suitable for individual farmer wherein water is lifted by electric motors and oil engines. Wells and tube wells are the second leading source of irrigation to the total irrigated area in the tahasil. The high proportion of area under well and tube wells irrigation in Mula and Pravara river basin is due to favorable states of ground water. In the study area well and tube wells are constructed privately for irrigation purpose. Water can be obtained as per requirement. The percolation tanks have become new phenomena in the above region which helped indirectly to increase the water table of wells.
5.2.6 Tank Irrigation:

The topography of the region is largely unsuitable for the development of tank irrigation. The most reliable is the one which depends on adequate storage or on rivers which have reliable flows throughout the crop season. Small tanks were the only source for storing waters. Tank irrigation is also fairly widespread in some parts of the tahasil. Tanks are shallow natural depressions that collect the vicissitudes of rainfall. Their storage capacity is generally small but is enhanced to a certain extent by constructing an embankment at the lower end of the tank.

Tanks in study area are mostly found in the Mula basin (Shirpunje, Balthan, Ambit, Kothale, Ghoti-shilwandi, Bori and Belapur-badgi), middle part of Pravara basin (Titwi-musha river and Waki-krishnawanti river) and in the northern part of Adhala basin (Padoshi and Sangvi-Adhala river) table and map no. 5.1 (I and II). The southern part of study area comes under the Mula basin. In this part, there are several tanks whose waters are used for irrigation. In the basin formed by hills, covered with forest Bori-Nala, Kauns River, Ghoti River, Kurkunde River and the various Nalas available in these parts. The whole of this vast water storage has been affected by means of embankments. The principal crops are grown on these sources i.e. rice, cotton, cereals, pulses, vegetables, flower crops and fodder crops. Good vegetable crops are grown in the Mula basin.
5.2.6.1 Existing Tank Irrigation Project:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of Tank</th>
<th>Project Year</th>
<th>Name of River</th>
<th>Total Capacity (MCM)</th>
<th>Use of Sanction Water (MCM)</th>
<th>CCA (hect)</th>
<th>ICA (hect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Waki</td>
<td>1992</td>
<td>Krishnawanti</td>
<td>3.19</td>
<td>2.60</td>
<td>644</td>
<td>515</td>
</tr>
<tr>
<td>2</td>
<td>Padoshi</td>
<td>-</td>
<td>Adhala</td>
<td>-</td>
<td>-</td>
<td>249</td>
<td>709</td>
</tr>
<tr>
<td>3</td>
<td>Sangvi</td>
<td>1993</td>
<td>Adhala</td>
<td>2.02</td>
<td>1.46</td>
<td>445</td>
<td>356</td>
</tr>
<tr>
<td>4</td>
<td>Bori</td>
<td>1981</td>
<td>Borinala</td>
<td>1.35</td>
<td>0.95</td>
<td>245</td>
<td>186</td>
</tr>
<tr>
<td>5</td>
<td>Bela-badgi</td>
<td>1979</td>
<td>Kauns</td>
<td>2.68</td>
<td>2.22</td>
<td>565</td>
<td>452</td>
</tr>
<tr>
<td>6</td>
<td>Ghoti-shilwandi</td>
<td>2008</td>
<td>Ghoti</td>
<td>4.53</td>
<td>4.41</td>
<td>1801</td>
<td>1801</td>
</tr>
<tr>
<td>7</td>
<td>Kothale</td>
<td>2007</td>
<td>Mula</td>
<td>5.17</td>
<td>4.28</td>
<td>1443</td>
<td>1443</td>
</tr>
<tr>
<td>8</td>
<td>Ambit</td>
<td>2003</td>
<td>Mula</td>
<td>5.86</td>
<td>5.46</td>
<td>1390</td>
<td>973</td>
</tr>
<tr>
<td>9</td>
<td>Shirpur-devhandi</td>
<td>2009</td>
<td>Kurkundi</td>
<td>4.40</td>
<td>4.16</td>
<td>1968</td>
<td>1968</td>
</tr>
<tr>
<td>10</td>
<td>Balthan</td>
<td>2007</td>
<td>Mula</td>
<td>5.72</td>
<td>5.01</td>
<td>1557</td>
<td>1074</td>
</tr>
<tr>
<td>11</td>
<td>Titwi</td>
<td>2007</td>
<td>Mushya</td>
<td>8.59</td>
<td>8.06</td>
<td>926</td>
<td>926</td>
</tr>
<tr>
<td>12</td>
<td>Pimp-khand</td>
<td>-</td>
<td>Mula</td>
<td>Work in Progress</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>43.51</td>
<td>38.61</td>
<td>11233</td>
<td>10403</td>
</tr>
</tbody>
</table>

Table No. 5.1

(Source: Irrigation Dept. Sub-division, Akole)

Note: Million Cubic Meters (MCM).

As is evident from table no. 5.1 the existing tank irrigation projects were very significant throughout the period. All these tanks are 100% depends on rainfall which is concentrated in the four months of monsoon. Titwi tank project is big project of the tahasil, water storage capacity of 8.59 mcm. The work of this tank is completed in 2007, CCA and ICA 926 hectare area out of the tahasil. Ambit capacity of 5.86 MCM, 1390 CCA and 973 ICA, Balthan capacity of 5.72 MCM, 1597 CCA and 1074 ICA, Kothale capacity of 5.17 MCM, 1443 CCA and 1443 ICA, Ghoti-shilwandi capacity of 4.53 MCM, 1801 CCA and 1801 ICA, Shirpur-devhandi capacity of 4.40 MCM, 1968 CCA and 1968 ICA, Padoshi 249 CCA and 709 ICA, Waki capacity of 3.19 MCM, 644 CCA and 515 ICA and Sangvi capacity of 2.02 MCM, 445 CCA and 356 ICA. At the present stage Bori and Belapur-badgi tanks working storage capacity process are closed. Pimpalgaon-khand, a new tank project work is process on Mula River.

Some part of tahasil minor tank irrigation scheme (Shet-tale) works under Zilha Parishad which is in progress. The Zilha-Parishad Ahmednagar has so far taken up various percolation tanks, out of which some are completed. There are about...
various proposals for the construction of percolation tanks in the tahasil which are under investigation.

5.2.6 Lift Irrigation:

A lift is an installation of pump, at a height close to the river bank that taps water from the river and allows it to reach the field through small channels constructed for this purpose. Presently the lifts are operated on river banks with ‘Jack-Well’ to which the water supply is regulated by constructing ‘Kolhapur Type Weirs’ (K T Weirs). The K T Weirs schemes are widely spread particularly in the Mula river basin. The preponderance of this source is observed in the southern parts of the tahasil [Map no. 5.1 (I and II) and table no. 5.2].

Due to the development of high head pumps, there is a new opportunity for irrigating high lands. Water can now be lifted from rivers or ponds by installing pumps either on the ground or on boats. The latter involve less cost and can be built quickly. Lift irrigation is now being increasingly used day by day. 3

5.2.6.1 Existing K T Weirs Project:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of K. T. Weirs</th>
<th>Project Year</th>
<th>Total Capacity (MCM)</th>
<th>Use of Water (MCM)</th>
<th>CCA (hect.)</th>
<th>ICA (hect.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Siswadh</td>
<td>1997</td>
<td>0.48</td>
<td>0.48</td>
<td>263</td>
<td>263</td>
</tr>
<tr>
<td>2</td>
<td>Khadki</td>
<td>1990</td>
<td>1.11</td>
<td>1.11</td>
<td>263</td>
<td>263</td>
</tr>
<tr>
<td>3</td>
<td>Sakirwadi</td>
<td>1992</td>
<td>0.67</td>
<td>0.67</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>4</td>
<td>Paithan</td>
<td>1992</td>
<td>1.13</td>
<td>1.13</td>
<td>534</td>
<td>534</td>
</tr>
<tr>
<td>5</td>
<td>Padalane</td>
<td>1997</td>
<td>0.75</td>
<td>1.37</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>6</td>
<td>Kotul</td>
<td>1993</td>
<td>0.54</td>
<td>0.83</td>
<td>181</td>
<td>181</td>
</tr>
<tr>
<td>7</td>
<td>Pim-Khand</td>
<td>1996</td>
<td>1.54</td>
<td>1.58</td>
<td>361</td>
<td>361</td>
</tr>
<tr>
<td>8</td>
<td>Pimpaldari</td>
<td>1993</td>
<td>1.12</td>
<td>1.12</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>9</td>
<td>Chass</td>
<td>2007</td>
<td>1.06</td>
<td>1.06</td>
<td>483</td>
<td>483</td>
</tr>
<tr>
<td>10</td>
<td>Lahit</td>
<td>2007</td>
<td>0.90</td>
<td>0.90</td>
<td>446</td>
<td>446</td>
</tr>
<tr>
<td>11</td>
<td>Lingdev</td>
<td>2001</td>
<td>0.67</td>
<td>0.67</td>
<td>348</td>
<td>348</td>
</tr>
<tr>
<td>12</td>
<td>Dha-Pat</td>
<td>2000</td>
<td>1.30</td>
<td>1.29</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>13</td>
<td>Bori</td>
<td>1997</td>
<td>0.95</td>
<td>0.95</td>
<td>492</td>
<td>492</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>12.22</strong></td>
<td><strong>13.16</strong></td>
<td><strong>4781</strong></td>
<td><strong>4781</strong></td>
</tr>
</tbody>
</table>

Table No. 5.2 (Source: Irrigation Dept. Sub-division, Akole)

Note: Million Cubic Meters (MCM).

Above table no. 5.2 and map no. 5.1 (I and II) the all existing K T Weirs project constructed on Mula River. 1993 to 2007 periods of 14 years, various parts of Mula River constructed in 13 K T Weirs projects. The principal crops grown on these
sources are vegetables, flower crops, cereals, and cotton, Soyabean, sugarcane and fodder crops. Siswadh K T Weir capacity of 0.48 MCM, 263 CCA and ICA, Khadki capacity of 1.11 MCM, 263 CCA and ICA, Sakirwadi capacity of 0.67 MCM, 350 CCA and ICA, Paithan capacity of 1.13 MCM, 534 CCA and ICA, Padalane capacity of 1.37 MCM, 300 CCA and ICA, Kotul capacity of 0.83 MCM, 181 CCA and ICA, Pimpalgaon-khand capacity of 1.58 MCM, 361 CCA and ICA, Pimpaldari capacity of 1.12 MCM, 400 CCA and ICA, Chass capacity of 1.06 MCM, 483 CCA and ICA, Lahit capacity of 0.90 MCM, 446 CCA and ICA, Lingdev capacity of 0.67 MCM, 348 CCA and ICA, Dhamangaon-pat capacity of 1.30 MCM, 360 CCA and ICA and Bori K T Weir capacity of 0.95 MCM, 492 CCA and ICA. At the present stage all K T Weirs are work in good condition.

5.2.7 Other Irrigation:

Local sources of irrigation refer here to the surface water schemes such as small stream diversion. The percolation tanks constructed for conserving moisture and replenishing groundwater also include under this source. According to census, the large is irrigated by these sources is included under private canals.

Based on co-operative spirit, the local people are involved in this percolation tank irrigation system. After rainy season, every year, the seasonal flow of streams is diverted by constructing small earthen dams. Obviously these local sources play significant role in irrigation of surroundings lands for kharip season only. Moreover, these sources of irrigation have the great advantages as these schemes can be completed quickly by using local talents and small capital. Since the peasants know the capacity of these sources, the water is regulated through small channels to the fields and the cropping pattern is adjusted accordingly. Being nearness to the source, the loss of water is saved considerably. The maintenance and operation costs are also very low.

5.2.7.1 Sprinkler Irrigation:

Sprinkler irrigation is an important method of saving water and reducing land costs involved in the construction of water courses by the use of sprinklers. Saving of land occupied by gravity canals by substituting sprinklers can be as much as 10%. Sprinklers irrigation can be used on all soils except heavy clay soils and all types of
crops except rice. Another advantage of sprinkler irrigation is that land need not be leveled as in gravity irrigation and the method in fact is best suited to irregular topography. There are two types of sprinklers. For high pressure operation, rotating head type is used, while for low heads, perforated pipes are used. Sprinklers need not be stationary and can be attached to moving machines. In sprinkler or overhead irrigation, water is piped to one or more central locations within the field and distributed by overhead high pressure sprinklers or guns.

5.2.7.2 Drip Irrigation:

Drip irrigation, also known as trickle irrigation, function as its name suggests. Water is delivered at or near the root zone of plants, drop by drop. This method can be the most water-efficient method of irrigation, if managed properly, since evaporation and runoff are minimized. In modern agriculture, drip irrigation is often combined with plastic mulch, further reducing evaporation, and is also the means of delivery of fertilizer. This technology has been developed lately to maximize water savings by limiting the water supplied to the consumptive use of the plant by maintaining minimum soil moisture in the root-zone. Further, fertilizers can also simultaneously be supplied by mixing them in the irrigation water. The drip irrigation system consists of:

i. A pump to lift the water and maintain the required pressure for circulation,
ii. Main and lateral lines and
iii. Dripping nozzles.

All the pipes are generally made of PVC. The rate of out-flow in the pipes is usually 2 to 10 liter per hours. Sources of irrigation, water can be groundwater extracted from springs or by using wells, surface water withdrawn from rivers, reservoirs or non-conventional sources like treated wastewater, desalinated water or drainage water. A special form of irrigation using surface water is spate irrigation, also called floodwater harvesting.

5.3 Electrical Facilities:

In the study area there is Maharashtra State Electric Board (MSEB) supply electricity for total villages. The total use of electricity in the study area, in the year
2010-11, was 2, 47,446,000 kilo watt per hour. The split up among the different types of uses are as follows:

5.3.1 Electricity use (000 kilo watt/ hour):

a. Agriculture - 96027,
b. Commercial and minor power storage – 81841,
c. Industrial – 33550,
d. Use of household – 31150 and
e. Social use - 4878.10

No doubt, electricity has become a substantial source of revenue, both directly as well as through realization of tax on agricultural and industrial production. Total 191 villages are mostly depend on MSEB are useful for connectivity. 220/132/33/11 kv these are the MSEB’S section provides for electricity. Use of electricity supply is 141.08 (KW) in per head and total 1.96 lakh electricity connections. Electrical Pump no of 5887 sets used for irrigation facilities.10

5.4 Chemical, Fertilizers and Pesticides:

Fertilizers a land were saving and labour saving input play dominant role in increasing the fertility of soils. After water, it constitutes there next most vital input for modern agriculture. Three types of chemical fertilizers are used e.g. Phosphatic, Nitrogenous and Potasic. Although such fertilizers are applied to hybrid crops like, jowar, rice, wheat, garden crops. Their proportion seems to be always high in case of irrigated crops like sugarcane, cotton, horticulture and floriculture, onion etc. It is observed that out of the total application of fertilizers, sugarcane crop shares about 45 percent of the region total. However, it was observed during the field trips that manures are applied during the land preparation phase of cultivation and higher use of the same is confined to the sugarcane growing lands.

Along with better seeds, fertilizers and irrigation plant protection has been accepted as one of the major factor in increasing the productivity of a land. As the high yield variety of crops are highly susceptible to pests and diseases, a serious damage and even annihilation of crops are likely if adequate and curative measures are not taken.

The spatial pattern of application of pesticides coincides with the spatial distribution of the use of improved seeds in the region. Relatively high use of
pesticides is confined to the northern, central and eastern part of the tahasils where use of improved seeds is also high. The use of HYV seeds of jowar, bajara, some fruits and vegetables like grapes and potatoes cultivation is also confined to these tahasils. The cultivation of rice and oilseeds are also traditionally practiced in these tahasil. Elsewhere the use of pesticides are insignificant due to the practice of using traditional and local varieties of seeds on one hand and cultivation of sugarcane on the other, where use of pesticides are rare.

Like seeds, the fertilizer consumption in study area has been rising continuously. Increasing area under horticulture and other high value exports crops (which have significant nutrition such as nitrogen, phosphate and potassium, NPK requirement), fertilizer consumption might increase further. At the regional level, in study area, per hectare usage of fertilizers are high and this has adversely affected soil fertility.

5.5 Machinery:

Modern farming tools and technology like tractors, thresher’s, harvesters and sprayers are also imperative for the successful cultivation of the High Yielding Varieties (HYV). These HYV varieties require adequate arrangements of controlled irrigation. Rising of two or three crops from the same field is possible only if the modern technology is available for the farmers. The indigenous plough and bullock or buffalo carts are less efficient to complete the agricultural operations on time. Machinery like tractors, thresher’s, sprayers, tillers, chaff cutters, leveler, pumping sets etc. are required for the timely operations of sowing, weeding, spraying and harvesting.
5.5.1 Agricultural Machinery and Implements:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Item</th>
<th>2010-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ploughs:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. Wooden</td>
<td>7523</td>
</tr>
<tr>
<td></td>
<td>ii. Iron</td>
<td>8259</td>
</tr>
<tr>
<td></td>
<td>iii. Blade harrow</td>
<td>1694</td>
</tr>
<tr>
<td></td>
<td>iv. Earth levelers</td>
<td>69</td>
</tr>
<tr>
<td>2</td>
<td>Sugarcane crusher</td>
<td>01</td>
</tr>
<tr>
<td>3</td>
<td>Plant protection equipment:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. Sprayers and dusters</td>
<td>445</td>
</tr>
<tr>
<td></td>
<td>ii. Oil engines with Pump sets used for irrigation</td>
<td>1965</td>
</tr>
<tr>
<td></td>
<td>iii. Electrical Pump sets used for irrigation</td>
<td>5887</td>
</tr>
<tr>
<td>4</td>
<td>Tractors (crawler, power tillers, four wheeled etc.)</td>
<td>1465</td>
</tr>
<tr>
<td>5</td>
<td>Tractor operated implements:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ploughs, harrows, cultivators or tillers, levelers or scrappers,</td>
<td>2896</td>
</tr>
<tr>
<td></td>
<td>seed-cum-fertilizers drills, seed planter, rotavator, trailer, other)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Power-driven machines and miscequipments:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. Wheat threshers</td>
<td>2301</td>
</tr>
<tr>
<td></td>
<td>ii. Rice threshers</td>
<td>09</td>
</tr>
<tr>
<td></td>
<td>iii. Other crops threshers</td>
<td>1290</td>
</tr>
<tr>
<td></td>
<td>iv. Power chaff cutters</td>
<td>24536</td>
</tr>
<tr>
<td></td>
<td>v. Other power operated equipments</td>
<td>10425</td>
</tr>
</tbody>
</table>

Table No. 5.3 (Source: Socio-Economic Abstract, Ahmednagar District)

Machines are being used for several operations of farming, but machines being run by mechanical power based on diesel, petrol, electricity etc. In the present situation use of machines and mechanical power is limited. The number of ploughs (wooden-7523 and iron-8259) are enormous, whereas the tractors (1465) and the tractor operated implements constitute a small number. Bullock carts (4819) driven by animals. The sugarcane crushers worked by bullock far outweigh those run by power. Pump sets used for irrigation powered by oil (1965) and electricity (5887) were till recently (2011) too many.10

5.6 Resume:

The predominant irrigation systems are canals, wells and tube-wells. During the study period, while areas under irrigation by wells and tube-wells had increased. However, the increase in irrigation by tube-wells in spectacular. The net irrigated area by tube-wells had doubled during 2000-01 to 2010-11. This huge increase in tube-
well irrigation necessitated provision of electricity or diesel fuel for operation of irrigation pumps. Akole Tahasil characterized ranking order consequently. The wells ranked first canal and dam second and other irrigation are third ranked.

Although water has multiple uses (drinking, power, industrial, pisciculture, etc) at present the single largest use of water resources in the study area is for irrigating lands, as agricultural inputs and especially for the production of food grains. For the growth of plants, water must be available in the appropriate quantities and at the right time, depending on the species of plant and climatic conditions. Crops like sugarcane and rice needs larger quantities than wheat and other cereal crops. Even dry farming technology depends upon the moisture retained in the soil by conserving the scanty rainfall through the construction of small bunds.

Irrigation in the study area has been practiced since old time but its development has been very fast after construction in the Bhandardara Dam. The present situation of irrigation is characterized by physiographic variation which influences the development of irrigation. As such, lift irrigation a pre-dominant source, shares about more than 50 percent of the total irrigated area is developed particularly on river banks. This is followed by dominance of well irrigation in the north and eastern parts of the tahasil and canal irrigation in the northern, middle and southern part of the tahasil. The percolation tanks have become new phenomena in the eastern part of the Tahasils which helped indirectly to increase the water table of wells.

The river Pravara, Mula, Adhala and Mhalungi then Bhandardara, Nilwande and Adhala dam are important sources’ of surface water which have facilitates canal and lift irrigation. The facilitates methods of irrigation also vary according to the Topography, Soil type and Climatic conditions. The variation in the regional pattern of irrigation and its intensity which in turn influences the adoption of agricultural technology, crop pattern, crop yield, productivity and intensity are increased.

Increase in the use of tractors, electric pumps, and oil engines, energy in general and inanimate energy also largely influenced by the disparities in the status of irrigation in the study area. Favorable government policies regarding loans and subsidies change the attitude of the farmers and impetus given by the co-operative societies and co-operative sugar factories are also contributing their due share in the adoption of improved machineries. However, the financial problem of small individual farmers for adopting the costly machines can be tackled by providing hire
service facilities with reasonable charges through agro service centers in the Tahasil. The efforts may also be made to popularize these implements through publicity, demonstration and arranging seminar of farmers. The significant correlation is also noted in case of fertilizers consumption and irrigated area. The application of fertilizers is high in irrigated areas devoted to cash crops. The irrigation faculties enable the farmers to cultivate high yielding varieties.

5.7 References: