CHAPTER II

SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT

The Nashik district, situated on the north-west side of Maharashtra is vulnerable to various kinds of hazards like sudden fluctuation in environmental factors, climatic changes i.e. cyclones, hailstorms, heat waves and cold waves, earthquakes, Volcanoes, floods, droughts and road railway accident, chemical hazards, communal violence, epidemic etc. The broad limits of agricultural activities are determined by physical environment of the region, but the individuals or farmers must conduct their enterprise within a frame-work of socio-economic and cultural considerations which may favor or restrict agricultural activities. The social system sets its imprint on holding and field systems and on settlement pattern with its related problems of accessibility to fields. Likewise social differences within communities and differences between communities affect the scale and type of farming operations together with the choice of enterprise (Morgan and Monton, 1971). Thus the size shape, and layout of farms, the farm worker’s densities, the agricultural implements in use, the extent of irrigation, the location of markets, transportation, the attitude of farmers, applications of farm fertilizers etc. all these influence the way in which agricultural land is used.

2.1) POPULATION:-

Agricultural land use is the end product of human response to physical-socio-economical, as well as technical and organizational factors. The land use is constantly modified by man according to his requirements. These modifications must be studied in conjunction with the various aspects of population, its distribution, growth, demographic characteristics and occupational structure. The relation between population and land-use is reciprocal, for instance, the changes in farm population pattern influence the utilization of the land, and later changes in the agricultural controls to a great degree also determine the pattern of farm population (Singh, 1974).

Nashik district has been settled for a long time and therefore the population of the region has its distinct characteristics, influenced by environmental factors of land, relief, the monsoonal rhythm and also the culture, shaped by maritime traditions in the past.
The district is inhabited by 29, 91,739 (1981) people spread over area of 15530 sq.km. This gives the region a density of 193 persons per sq.km. compared to the state density of 204 persons per sq.km. The variation in the distribution of population is largely resource oriented, varying with the productivity of land, urbanization, and degree of industrial development. As per census of 2011 the population of Nashik district was 61, 07,187. The population density stands at about 393 persons per sq. km. The district has a majority of Hindu population. However, there are pockets of Muslims and new Buddha population. Other communities like Sikhs and Christians are sparse in number.

GROWTH OF POPULATION:-

In an overall consideration of population position over the last few census decades, it may be said that the district has shown a constant growth of population from the beginning of the 20th century, except during the severe influenza epidemic, which took a heavy toll of life in the second decade of the century. In the last four decades population has increased at a very high rate. It was primarily due to the growth of Nashik city which attracted migrants. The net percentage increase in the population of the district, from 1901 to 2011, is higher than that of the Maharashtra state as a whole.

Table No.2.1 The population of the district and decade variation rates since 1901. (District as a whole).

<table>
<thead>
<tr>
<th>Years</th>
<th>Total Population</th>
<th>Decade variation</th>
<th>Percentage of decade variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>8,23,080</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>1911</td>
<td>9,15,698</td>
<td>+92,618</td>
<td>+11.25</td>
</tr>
<tr>
<td>1921</td>
<td>8,45,783</td>
<td>-69,915</td>
<td>-07.640</td>
</tr>
<tr>
<td>1931</td>
<td>10,09,583</td>
<td>+1,63,800</td>
<td>+19.37</td>
</tr>
<tr>
<td>1941</td>
<td>11,27,597</td>
<td>+1,18,014</td>
<td>+11.69</td>
</tr>
<tr>
<td>1951</td>
<td>14,29,916</td>
<td>+3,02,319</td>
<td>+26.81</td>
</tr>
<tr>
<td>1961</td>
<td>18,55,246</td>
<td>+4,25,330</td>
<td>+29.75</td>
</tr>
<tr>
<td>1971</td>
<td>23,69,221</td>
<td>+5,13,975</td>
<td>+27.70</td>
</tr>
<tr>
<td>1981</td>
<td>29,91,739</td>
<td>+6,22,518</td>
<td>+26.28</td>
</tr>
<tr>
<td>1991</td>
<td>38,50,000</td>
<td>+ 8,58,261</td>
<td>+22.37</td>
</tr>
<tr>
<td>2001</td>
<td>49,93,796</td>
<td>+1,143,796</td>
<td>+22.90</td>
</tr>
<tr>
<td>2011</td>
<td>61,07,187</td>
<td>+1,090,044</td>
<td>+17.91</td>
</tr>
</tbody>
</table>

DENSITY OF POPULATION:-

Population density values were calculated as ratios of total population to total area (sq. k.ms). In 1991 the density of population was 149, and it was 393 in reference year 2011. In general density of population was along the western margin of the district. The lowest density (172 persons per sq.km) is recorded in Surgana taluka, and highest density (2509 persons per sq. k.ms.) in the Nashik taluka (Nashik and Trimbak).

On the eastern side, population density increases gradually. Density of 100 to 200 persons per sq. k.m. is observed over most parts of the district. (Table No.2.1 and Fig.No.2.1)

**Table No. 2.2**

*Density of Population (Taluka wise) per sq.km.*

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Talukas</th>
<th>Years 1991</th>
<th>Years 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nashik</td>
<td>177</td>
<td>2509</td>
</tr>
<tr>
<td>2</td>
<td>Peint</td>
<td>95</td>
<td>173</td>
</tr>
<tr>
<td>3</td>
<td>Dindori</td>
<td>110</td>
<td>197</td>
</tr>
<tr>
<td>4</td>
<td>Surgana</td>
<td>87</td>
<td>172</td>
</tr>
<tr>
<td>5</td>
<td>Kalwan</td>
<td>108</td>
<td>390</td>
</tr>
<tr>
<td>6</td>
<td>Baglan</td>
<td>119</td>
<td>211</td>
</tr>
<tr>
<td>7</td>
<td>Malegaon</td>
<td>174</td>
<td>432</td>
</tr>
<tr>
<td>8</td>
<td>Chandwad</td>
<td>128</td>
<td>214</td>
</tr>
<tr>
<td>9</td>
<td>Nandgaon</td>
<td>138</td>
<td>217</td>
</tr>
<tr>
<td>10</td>
<td>Yeola</td>
<td>135</td>
<td>221</td>
</tr>
<tr>
<td>11</td>
<td>Niphad</td>
<td>137</td>
<td>397</td>
</tr>
<tr>
<td>12</td>
<td>Sinnar</td>
<td>130</td>
<td>215</td>
</tr>
<tr>
<td>13</td>
<td>Igatpuri</td>
<td>159</td>
<td>270</td>
</tr>
<tr>
<td></td>
<td>Nashik District</td>
<td>149</td>
<td>393</td>
</tr>
<tr>
<td></td>
<td>Maharashtra State</td>
<td>170</td>
<td>204</td>
</tr>
</tbody>
</table>

Source: Socio-Economic and Statistical Abstract, of Nashik District.
Table No. 2.3
Spatial analysis of talukas on the basis of population density.

<table>
<thead>
<tr>
<th>Category (Range of population density)</th>
<th>Total No. of talukas 1991</th>
<th>Total no. of talukas 2011</th>
<th>% of talukas to total No. of density talukas 1951</th>
<th>% of talukas to total No. of density talukas 1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-100</td>
<td>2</td>
<td>--</td>
<td>15.3</td>
<td>00.00</td>
</tr>
<tr>
<td>101-200</td>
<td>10</td>
<td>3</td>
<td>77.0</td>
<td>23.10</td>
</tr>
<tr>
<td>201-300</td>
<td>--</td>
<td>6</td>
<td>--</td>
<td>46.10</td>
</tr>
<tr>
<td>301-400</td>
<td>1</td>
<td>2</td>
<td>7.70</td>
<td>15.40</td>
</tr>
<tr>
<td>Above 401</td>
<td>--</td>
<td>2</td>
<td>--</td>
<td>15.40</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>13</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table No. : 2.4 Tendency of talukas towards increases and decreases in area under population density.

<table>
<thead>
<tr>
<th>Category</th>
<th>Total No. of talukas Increases (+ve)</th>
<th>Total No. of talukas Decreases (-ve)</th>
<th>Percentage of the total No. of Increase talukas</th>
<th>Percentage of the total No. of Decrease talukas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>51.00 to 100.00</td>
<td>Peint, Dindori, Surgana, Baglan, Chandwad Nandgaon Yeola, Sinnar = 8</td>
<td>Nil</td>
<td>61.50</td>
</tr>
<tr>
<td>Low</td>
<td>101.00 to 150.00</td>
<td>Igatpuri = 01</td>
<td>Nil</td>
<td>7.70</td>
</tr>
<tr>
<td>Medium</td>
<td>151.00 to 200.00</td>
<td>Nil</td>
<td>Nil</td>
<td>0.00</td>
</tr>
<tr>
<td>High</td>
<td>201.00 to 250.00</td>
<td>Nil</td>
<td>Nil</td>
<td>0.00</td>
</tr>
<tr>
<td>Very High</td>
<td>Above 250.00</td>
<td>Nashik, Kalwan, Malegaon, Niphad=4</td>
<td>Nil</td>
<td>30.80</td>
</tr>
</tbody>
</table>
SPATIAL ANALYSIS:-

Though the spatial distribution of population interlaid, is largely determined by physical environment, it is especially significant in agricultural environment constituting the markets where the demands for various agricultural products are met.

The Fig No. 2.1 and Table No. 2.4 show the spatial distribution of density of population talukawise. There are five categories so far as the density of population is concerned.

1) The first Category:-

This is a category of very low population density with density between 1-100. It is found in two talukas in 1991 reference year. These talukas can be found only in the western part. The western region is made up of three talukas. Out of them Surgana & Peint come under this category. All of them are located in the north-south extension on the western margin of the study area. These are located in high relief zone with steep slopes and mountainous terrain of the Western Ghats. These talukas come under high rainfall zone i.e. more than 1500 to 2000 mm. There is a lot of soil erosion so that the soil cover is very thin. Further, the talukas are forested. Hence the possibilities of agriculture and agricultural development are limited. Hence they constitute the lowest density area. Surgana taluka has the lowest density (87 persons per sq.km.) in the entire study area. Peint taluka had the maximum density (95 persons per sq.km.) in the western region in the reference year 1991. Not a single taluka belongs to this category.

2) The Second Category:-

The second category is of the talukas with density between 101 to 200 persons per sq.km. Out of total talukas of the study area 11 talukas (84.60 percent-1991) and 3 talukas (23.10 percent 2011) are included in this category. These can be divided into three sections such as central, southern, and Northern as well as eastern. The northern region has three talukas which are more or less continuous. The density of population is comparatively higher in relation to the first category. It is due to generally sloping land, medium to low rainfall, better soils in the valley floors and above all irrigation facilities.
As per reference year 1991 Kalwan taluka has the lowest density (108 persons per sq. k.m.) and Nashik has a maximum density (197 persons per sq.km). The central and eastern regions are made up of 6 talukas. Though the talukas lie in Central and Eastern parts where rainfall is medium to low, the soils are also medium. Irrigation is available on large scale as in Baglan and Kalwan talukas that is the reason why the density is between 100 & 200 persons. The influence of cash crops, especially sugarcane in the eastern and central part is another reason why the density is 100 to 200 persons as in Baglan & Kalwan talukas. The central parts of the area are generally continuous. They extend towards east as well as southward in a continuous belt. Two talukas of the western part i.e. Dindori, Kalwan and Igatpuri are located on the western part, where the rainfall is heavy and soils are poor. But the high percentage of density of population is due to better land management.

As per reference year 2011 three talukas i.e. Peint, Dindori and Surgana belong to this category. Causes are the same as above.

3) The Third Category:-

As per reference year 2011 six talukas (46.10 percent) i.e. Baglan, Chandwad, Nandgaon, Yeola, Sinnar and Igatpuri account for this category. This category consists of talukas with density between 201 to 300 persons per sq.km. This would be considered as a high density range. These talukas can be conveniently divided into the north eastern and central region. All talukas receive high to medium low rainfall, but have irrigation facilities. The soils are medium and deep black, hence agriculture is the main economic activity. Industrialization and sugar factories are also responsible for the density of the population of this category. Not a single taluka belonged this category in reference year 1991.

4) The Fourth Category:-

The fourth category of high population density ranging from 301 to 400 persons per sq.km. is found in the year 2011 i.e. in Kalwan and Niphad due to education facilities, development of sugar factories and increased agricultural production.
5) The Fifth Category:-

The highest density category ranging more than 401 persons per sq.km. Nashik and Malegaon taluka belong to this category. Both talukas have the highest density in the study region. This is a result of the urban influence and industrialization. Besides urban influence of Nashik city, the taluka has the location in the Godavari flood plains and irrigation facilities are available. M.I.D.C area of Nashik city is also responsible for high density of population. Malegaon M.I.D.C. is also responsible for increasing density of Malegaon city. No of persons migrate from other talukas to Nashik and Malegaon city. The spatial variation in the density pattern is closely related to availability of land for cultivation, irrigation facilities, soil fertility, adequate rainfall and industrial development.

2.2) OCCUPATIONAL STRUCTURE:-

The total availability of labor (as a resource) and its division over different economic activities can be considered as a measure of the overall economic development. A study of the work force engaged in a primary, secondary, and tertiary type of productions will be significantly useful for this purpose. In reference year 1991, the worker and dependents were not separated, so there was very high proportion of total workers in the population. Therefore no significant variations in the distribution of total workers are observed. The lowest proportion of workers in total population is 91.18 % and highest is 100 %. The ratio of total workers to the total population exhibits a specific spatial pattern. The western high rainfall zone shows higher values in the northern and central parts as well as the southern part of the transitional zone and therefore the proportion of total workers further declines.

The pattern changes slightly in the reference year 2011 with the proportion of total workers decreasing fast over the entire district. Only in the western high rainfall zone (Igatpuri, Surgana & Peint talukas) the ratio is higher, but the decadal variation is negative in the central and eastern zone, so the proportion of the total workers further declines. The temporal variation in the ratio of working force to total population thus reveals the gravity of the problem of ever growing population and pressure on land causing unemployment and underemployment.
FARM WORKERS AND THE TOTAL WORKFORCE:-

Most of the working population is engaged in farming, either as cultivators or as agricultural laborers in the rural area of the district. Population census, 1991 divides the total population of the district in the following classes.

1) **Agricultural class:-**
   a) Cultivators of land wholly or mainly owned and their dependents.
   b) Cultivators of land wholly or mainly unowned and their dependents.
   c) Cultivating laborers and their dependents.
   d) Non-cultivating owners of land, agricultural rent receivers, and their dependents.

2) **Non-agricultural classes:-**
   a) Production other than cultivation
   b) Commerce.
   c) Transport.
   d) Other services and miscellaneous.

This classification fails to record the actual number of persons engaged in agricultural activity including their dependents, the sum of classes a, b and c defines the class of farm workers and their dependents in the year 1991. There is a high proportion of the farm workers and dependents to the total of the other, in the western high rainfall zone of the district. On the other hand the proportion decreases in the central and eastern part. Around the parts of Nashik city the values are still lower.

This spatial distribution does not give us a correct picture of the farm workers in the total workforce as the “dependents” inflate the actual strength of workers.

The following occupational classes in the district are recorded in the year 2011 population census.

1) **Total workers:**
   a) Cultivators b) Agricultural laborers c) Mining, quarrying livestock, fishing hunting etc. D) Household industry. e) Manufacturing other than household industry f) Construction g) Trade and commerce h) Transport, storage, and communication i) other services.
2) Farm workers:

Cultivators and agricultural laborers together make up the class of farm workers. The proportion of farm workers to the total workers in 1991 has been high percentage in the Western zone and low in the central and eastern zone.

In 2011 there is slight change in workers. The class of mining and quarrying workers has been separated from the workers in livestock, orchards, forestry, fishing etc. Secondly, the class of household industry has been excluded. Except these two changes other classes remain unaltered. The ratio values have increased in northern and central parts of the western high rainfall zone. The low ratio values are observed around Nashik city, and a few patches of central and eastern part of the district.

Spatial distribution of the proportion of total farm workers in the years 1981, 1991, and 2011 thus reveals the importance of agriculture as a source of employment in the rural areas. In the western high rainfall and high relief zone more than 85 percent of the total working force, is still absorbed by the agricultural activity. In the central and eastern part, a few patches of areas have quite high. The only exception to this trend is the development of a belt around Nashik city, Ozar Township, the areas around the sugar factories, Nashik Road and Deolali Cantonment, where due to the availability of alternative employment in the industrial, commercial & administrative sectors the employment of agriculture is about 50percent to 60percent of the total workforce. Recently (2015) this belt has extended in the western and eastern part of Nashik along the Nashik- Bombay road (Ambad), Nashik- Poona road and Nashik- Trimbak road (Satpur) link, which is also an industrial area.

2.3) CULTIVATORS:-

Cultivators are the main part of the farm workers. The category of cultivators includes both the owner cultivator and the tenant cultivators. Along with workers directly working on the land, are also included persons who are engaged in supervision or direction of cultivation.

The spatial distribution of cultivators in 1951 indicates that out of the total farm workers the cultivators and their dependents share a larger proportion. Higher values were found in the western high rainfall zone, but around the city the proportion has decreased. The distribution in 2011 shows a further decrease in the proportion of cultivators all over the district. There are higher values in the western part and lower values in the central and eastern parts of the district.
AGRICULTURAL LABOURERS:-

For the sustained development of agriculture, the supply of agricultural laborers is essential. During the peak (crop) season the shortage of agricultural laborers may adversely affect the agricultural production. There has been an increase in the percentage of the agricultural laborers of the total workers in 2011.

The reference year 1991 shows low percentage in some talukas of the eastern and the central parts of the district i.e. Nashik, Sinnar and Igatpuri, medium percentage in Yeola taluka from the eastern part and Surgana from the western part of the district. Higher and Highest percentage concentration of agricultural labors is observed in Peint and Dindiori talukas from the western part and Baglan, Malegaon, Niphad, Chandwad and Nandgaon from the central and eastern part of the district. The highest percentage is found in Peint taluka and the lowest percentage in Nashik taluka.

A phenomenal increase in the proportion of the agricultural labors is observed in the year 2011. With 1991 as the base percentage of agricultural laborers there is a rise by 10 percent to 60 percent all over the district. The highest percentage is found in Niphad taluka and the lowest in Surgana taluka. Lower percentages are found in the western part of the district i.e. Peint, Surgana and Igatpuri taluka.

In general all over the district the proportion of agricultural labors is increasing rapidly. It also exhibits a spatial pattern viz to the highest percentage in the north central and eastern talukas, high in the central and south central part and low in the west. Probable explanation of this occurrence is that the population of the entire district is growing fast. So the pressure of population on land increases, land is also divided. A class of small holders and land less agricultural laborers evolves. Irrigation is also responsible for increasing the agricultural laborers. In the irrigated tracts, the size of land holding is larger. As the water supply is assured, multiple cropping is possible, which initiates the seasonal as well as permanent demand for agricultural laborers and for different types of agricultural activities.
2.4) **LAND TENURE:**

In consideration of any agricultural society or region the forms of land tenure of the past and present have an important role, as the tenure by which it occupies its land has a vital bearing on agriculture. The tenurial aspects concern the complex relation between lands on the one hand and the various interests in on land-cultivators, owners, government- on the other hand. It governs the conditions under which the land is exploited and inputs are used (Khusro, 1973).

The land concept of land tenure is defined as a system of individual agreement under which land is held or occupied. It includes all forms of tenancy and ownership.

Land tenure systems have far reaching effects on the land use patterns as the degree of independence the farmer has, to take farming decision, is basically related to the extent of ownership of the land. Numerous tenure systems can be identified on the basis of such freedom from making decisions, though three basically distinct classes viz. ownership, communal ownership and tenancy can be easily identified (Morgan and Monton, 1971 pp.55)

There are a number of economic advantages of ownership. Farmers have freedom to choose the system of production, full benefits of the returns from all investments, increasing capital gains with rising prices of land consequently increasing capacity to borrow. The farmer has freedom of making his own decision. The form of tenancy based on short or long lease on the other hand limits the freedom to a considerable extent as the total returns are not directly available to the farmer and he has to share them with the land owner. Tenancy of freedom depends on the conditions of lease and in the worst case the farmer is apparently reduced to a kind of laborer when the land lord provides the equipment and accommodation. Very short leases mean insecurity for the tenants. On account of the very limited period of lease, the tenant usually plans for immediate returns so as to get maximum returns during the short tenure. There are mainly four types of tenures 1) Zamindari tenure 2) Inam tenure 3) Mahalwari tenure and 4) Rayotwari tenure.

Rayotwar tenure accounted for a major portion of the occupied land in Nashik district and a minor portion was occupied by Inam tenure (District Gazetteer). Land may be held in single independent holdings under the rayotwari system. The
individual holders are severally responsible to the state for the payment of land revenue. The occupant had a right to hold the land perpetually so long as he paid the land revenue to the government. He had full powers to sell, mortgage or dispose of the land. In inam tenure the land is held on a reduced assessment not liable to revision and in some cases even free of assessment.

Land was cultivated either by owner or tenants in both these tenure systems. There were four modes of tenant cultivation in operation in the district viz. cash rent, crop share rent, a fixed quantity of produce as a rent and a rent in service involving some combination of the foregoing forms of rent. The main forms of rent are cash rent and crop share rent.

The relation between land lords and tenants were governed by the provision of the Bombay land Revenue Code of 1879. Many tenants who held the same lands for generations had no permanent right to tenancy, but were continued to be tenants –at-will, liable to be deprived of their tenancy at the will of their landlords. The Bombay Tenancy Act of 1939 was amended in 1946 and further the Act itself was replaced by the Bombay tenancy and agricultural Lands Acts of 1948. Finally the agricultural land tenancy was legally abolished in 1957 and is permitted only in a few specific cases. Hence, cultivation of land is done mostly by peasants who own lands. This land reform aimed at redistribution of the ownership of holding form the view point of social justice and of reorganizing operational holding from the view point of social justice and optimum utilization of land. The entire concept of land reforms aims at the abolition of intermediaries and bringing the actual cultivators in direct contact with the state. There are three categories of the total number of operational holdings in the district

1) Owner operated (92 percent of holdings).
2) Partly owned and partly rented (6.5 percent)
3) Wholly rented (1.5 percent).

SIZE OF LAND HOLDINGS:

The size of land holding is an important factor in determining the efficient use of the resources available to a farmer. An analysis of per capita rural agricultural holding provides the key to the enormity and seriousness of the land problems in the
predominant agrarian economy of Nashik district. For the size of farm decides the degree of risk-taking and possible effects of specialization, the quantity and size of equipment and power. Moreover, size is related to population pressure, to economic requirements, such as the farmer’s resources, capacity, attitude, crop pattern, type of farming, to land quality and to historical tradition. In Nashik district, as in the rest of India, a definite standard size of farm suitable to a definite type of farming cannot be maintained because of the increasing burden of population on agricultural land and the working of the Hindu Laws of inheritance. These result in the division of a large proportion of cultivated holdings into small, often widely separated fragments which fail to conform to any reasonable economic standard.

The main cause of low agricultural efficiency in India is fragmentation and subdivision of holdings. Apart from population pressure, the small size of farm could be attributed to laws of inheritance, decline of joint family system, absence of alternative employment opportunities in the form of handicrafts and village industries, lack of capital investment and attachment to landed property. The results are existence of numerous small size farms and widely scattered pieces of land which are uneconomic. These uneconomic farms give rise to wasteful methods of farm operations.

There are many disadvantages of fragmentation and scattered holdings, like wastage of time in the need to supervise and difficulty of working with a tractor, Weed and pest control is made difficult and there are limitations in mechanization and experimentation. On the whole it is a serious impediment to the agricultural progress and acts as a deterrent to full utilization of land and farm force (Jusbir sing, 1974).

The average size of the holdings (2011) in the district is 4.2 acres. Other districts in the state show large variation in size i.e. from 03.00 (Kolhapur) to 10.00 acres for Yawatmal. (Government of Maharashtra). The number of small holders (holding size below 05.00 acres) was appreciable in the districts i.e. 55.00 percent, 20.00 percent operated in Medium sized holding (05.00 – 10.0 acres). Large size holding (10 – 15 acres) found to 15.00 percent and landlords and only 10 percent holders belong to very high size of holding (above 15 acres) These figures demonstrate the unequal distribution of land holdings i.e. a large number of small holders occupying a smaller area and very big holders (landlords) occupying a large area.
LAND CONSOLIDATION:-

The fragmentation is a very big problem of India. A possible solution to this problem is in the consolidation of holdings, so as to enable a farmer to save his time, labor charges and energy. So the Govt. Of Bombay enacted a law called the Bombay Prevention of Fragmentation and Consolidation of Holdings Act. At present the work has been completed in some parts of the districts, but it is lagging behind in the western part.

The provisions of the Bombay prevention of Fragmentation and Consolidation of Holdings Act. 1947 were applied to the district in 1949. The scheme is to arrange mutual exchange of small and scattered fragments of holdings and to make the land holdings as compact as possible.

CEILING ON HOLDINGS OF AGRICULTURAL LAND:-

The Maharashtra Agricultural Lands (ceiling on holdings) Act came in force from 26th January 1962. It lays down the ceiling limit of 7.5 -35 hectares. For a family of more than five members the ceiling is raised to a maximum of double this limit. But Ceiling is on an individual holding and not on a family holding. The level of ceiling on agricultural holding has been brought down further in the light of the national policy evolved in 1972. Amended act (Act No. II of 1976) has been brought into force with effect from 2nd October, 1975, which sets the limits at 18 acres for irrigated lands and 54 acres for dry crop land. The unit of application of lowered ceiling is now a family unit consisting of husband, wife and minor children (Government of Maharashtra 1977).

According to the Maharashtra Agricultural Land Act, Sinnar and Malegaon talukas have been notified in the district with different ceiling areas for dry crop land, viz. 96 and 84 acres, respectively.

2.5) AGRICULTURAL IMPLEMENTS:-

Although the region under study experiences adoption of improved implements, the use of traditional implements associated with subsistence agricultural is common. Increased investment of traditional inputs does not lead to levels of output high enough to make a breakthrough for self –sustained agricultural development (Daniel – 1976).
Various implements are used by farmers in carrying out the agricultural operations with an object of reducing labor and improving the agricultural productivity. Tillage implements are used to work the soil and control the weed. The most common tillage operations are ploughing, harrowing, levelling ridging, hoeing and inter cultivation. Operations like harvesting, threshing, winnowing and finally the transport of agricultural produce involve the use of implements and machinery worked by animate and inanimate power. Other farm machines and appliances used by the farmers include various kinds of water lifts, cane crushers, chaff cutters, rice hullers, groundnuts decorticators, sprayers and dusters. The type of implements and alliances used on a farm are a good indicator of the type of farming and economic and social status of a farmer.

1) WOODEN PLOUGHS:-

The basic tillage implement commonly used by the Indian farmer is the plough. Wooden plough is a traditional implement which is widely used by the farmers all over the district, but mainly the western tehsil i.e. Dindori, Peint and Igatpuri. Very high concentration with more than 15,000 wooden ploughs is confined to the western and central talukas such as Dindori, Kalwan, Baglan and Igatpuri. High concentration occurs in the zone which stretches in north south direction in the central section of the study area. Adjacent talukas to the east and southern portion of the districts have moderate proportion of this side (Yeola, Nandgaon and Chandwad), the high proportion of wooden plough in the hilly parts and central western parts is due to its patentability and suitability for the poor soils.

The wooden ploughs usually made up of babul wood, are in common use in the district. They are cheap and are usually manufactured and repaired locally by the village carpenters.

2) IRON PLOUGH:-

In spite of the advantages of the wooden ploughs, the farmers in the district are slowly adopting the iron plough. The iron ploughs are more efficient and particularly suitable for heavy soils. The iron ploughs facilitate deep ploughing as compared to wooden ploughs. According to their capacity for deep ploughing the iron ploughs are pulled drawn by either two, four or more pairs of bullocks depending on the type of soil. The heavy iron ploughs are preferred in medium to deep black alluvial soils. In black cotton soil the land is ploughed deep (22 to 30 cm.) once in three or four years to destroy weed growth and to break the hard pan layer. Instead of
the plough, blade harrows (Kulav, Aut or pharat, wakhar) are commonly used to prepare land in the black and medium black soil tracts. The indigenous harrows are quite cheap and easy to construct and repair. They can also be put to variety of uses like breaking clods and smoothing, covering seed, preparing seed beds and levelling (Locally this instrument is known as DANKHYA and WAKKAR).

3] SEED DRILL:-

Seed drills (Pambhar or Teephan) help the sowing of seeds in line in a field at uniform depth.

4] KOLPA:-

It is slit hoe and used for inter culturing crops like Bajara, Jowar etc. This is a miniature blade harrow and is used to work in between lines of crops to stir the soil so as to remove the weeds, loosen the soil, conserve moisture and aerate the soil.

Other tillage implements common in the district are Kurhad (axe), Kudali (pick axe), Koyata (bill hook), Vila (sickle), Pahar (crow bar), Phavada (spade), Khurpi (weeding hook) and phantole (rake), Sickle is used for harvesting.

Threshing is commonly done by treading the crop by teams of bullocks or bullock-carts. The threshed material has to be winnowed for separating grain from chaff. Traditionally farmers depends on wind breeze for this operation. For lifting water from wells, mhothes made of iron or leather are used. Nowadays they are replaced by diesel engines and electric pumps. Bullock carts are also important implements for carrying, the agricultural products, and also play an important role in the rural transport system.

5] TRACTORS:-

It is the most important implement in the mechanization of agriculture. The mechanical power in the form of tractor, diesel engines and electric pumps is a pre requisite for augmenting the productivity of land. Tractor, a labor saving input, is used for several operations in agriculture. It has become an essential vehicle for transportation.

A temporal review of the changes in the agricultural implements and appliances, thus enables one to judge the progress of an agricultural region. It has been observed that along with the number of ploughs in the district the proportion of iron ploughs to the wooden ploughs has also increased. Sugarcane Crushers, worked by bullocks or power operated, were in large numbers in the reference year 1991. Their number has declined (because of development of sugar factories) over the
In the district oil engines and electric pumps have multiplied in the last two decades. Both are increased in the reference year 1991. But numbers of oil engines declined in the year 2011 because they were replaced by electric pumps, so the number of electric pumps increased in the year 2011, because of the rural electrification programme. There was a similar increase in the number of tractors in 2011.

ROAD ACCESSIBILITY:-

The success of agriculture depends upon a good network of roads in the countryside. Roads connect the area of production and consumption, which facilitate the flow of agricultural commodities. In the Godavari, Girana and Mosam Basins, road transportation is dominant, and is overburdened by heavy vehicular traffic of trucks, tractors and carts. Train transport is also useful for transporting agricultural products like vegetables, fruits, grapes etc.

The district had 14075 k.ms. road length (N.H., S.H., D.H. and all types of roads), in the year 1991, and in the reference year 2011 it was 14203 k.ms.

The road accessibility in the district is uneven. The Godavari basin, Girana and Mosam basin or the industrial zone of Nashik have attained better accessibility of roads within 5 km from main roads because of the concentration of sugarcane and other important agricultural products like fruits and vegetables. The talukas Baglan, Malegaon, Niphad, Nashik, Kalwan and Dindori have this advantages position due to efforts made by the sugar factories and also the state government. In contrast, the western hilly talukas i.e. Peint, Surgana and Igatpuri are inaccessible (beyond 10 km.). This poor accessibility can be attributed to rugged topography and consequently poor development of roads. The moderate accessibility (5 to 10 km) is confined to the eastern and northern talukas (Nandgaon, Yeola and the east part of Chandwad) in the district.

**2.6) TRANSPORT AND COMMUNICATION**:-

A well-developed network of means of transport is indispensable for the economic development of the country. Inadequacy of transport puts bottlenecks in growth, since production and distribution are dependent upon efficient, reliable, competitive and quick transport systems. (Arunachalam)
Economic development of the region depends on good means of transport and communications. Transport facilities have great impact on the location and intensity of farming systems. The agricultural produce requires efficient communication networks for reaching the markets situated in different parts. Nashik district is also no exception. It is obvious that the western part of the district has comparatively less transport facilities because of hilly and mountainous area, on the other hand the central and eastern parts have better communication facilities, both roads and railway routes being predominant in these parts. (Fig. No. 2.2)

ROAD TRANSPORT:-

Road transport has played a significant role in the economic growth of the study area since historic times. The road network is relatively well spread in the district. The road development in the district on a larger scale started in the second half of the nineteenth century. Initially the main trunk lines connecting the neighboring areas were constructed. With the growth of economic activities in the district, the production and market centers had to be connected with district headquarter. Nashik is on the intersection of two National Highways i.e. Mumbai-Agra National Highway-3 and the Nashik – Pune National Highway- 50.

In 1991 the district had 13839 k.ms. (Except N. H.) of road. The road systems was maintained by (i) State Government, (ii) District local Board and (iii) Municipal Bodies. In the last two decades road mileage has doubled itself. Nowadays roads are maintained by B and C department, Zilla Parishad and Municipalities and Municipal Corporations.

In the central and eastern part of the district, road network is more complex. Road accessibility is improved, but the village roads still are not maintained properly and in some cases, in the rainy season they are not motorable, thus isolating the area from the main transport link. In the western part the road position is very poor in the rainy season. In the rural area of the district, chief mode of transport is bullock cart. Agricultural produce from the farm to house and then to the market is transported by carts.
RAILWAY TRANSPORT:

Railway transport is one of the fastest means of communication. The total railway length in the district in the year 1991 was 243 k.ms. Further the railways were classified into broad gauge, meter and narrow gauge categories. The broad gauge lines were subdivided into single, double and triple gauge. In 2011 Nashik district had a total length 287 k.ms. of railways. (Table No. 2.6). The railway serve only a smaller area as compared to roads in the district, but both these media of transport are important for the district. Manmad is an important junction. Nashik Road railway station is a major railway station and Igatpuri, Lasalgaon are also important railway stations. Nashik is directly connected to various major cities in India. Like Mumbai, New Delhi, Kolkata, Nagpur, Chennai, Kanpur and Guwahati etc. We may conclude that the entire development and efforts to increase accessibility are mostly linked with the extension of the road system. The extension of roadways in the present inaccessible areas will bring a large portion of area and population in the main stream of the economic growth of the district.

Table No. : - 2.5
Length of Various Types of Road in Nashik District in k.ms. (1991 And 2011)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Roads</th>
<th>Total Length of Road in k.ms. 1991</th>
<th>Total Length of Road in k.ms. 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>National Highway</td>
<td>236</td>
<td>289</td>
</tr>
<tr>
<td>2</td>
<td>State Highway</td>
<td>1,735</td>
<td>1,690</td>
</tr>
<tr>
<td>3</td>
<td>Main District Road</td>
<td>2,141</td>
<td>2,227</td>
</tr>
<tr>
<td>4</td>
<td>Other District Road</td>
<td>2,192</td>
<td>2,400</td>
</tr>
<tr>
<td>5</td>
<td>Rural Road (Gramin Road)</td>
<td>6,981</td>
<td>7,575</td>
</tr>
<tr>
<td></td>
<td>Total Length of All Types of Roads in k.ms.</td>
<td>14,075</td>
<td>14,203</td>
</tr>
</tbody>
</table>

Table No. : - 2.6  

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Railway route</th>
<th>Total length in k .m.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1991</td>
</tr>
<tr>
<td>1</td>
<td>Broad Gauge</td>
<td>243</td>
</tr>
<tr>
<td>2</td>
<td>Metre Gauge</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>287</td>
</tr>
</tbody>
</table>
Airways: - Ozar is an important airport in Nashik district. It is located at a distance of 20 k.ms. from the city center. This will boost the connectivity and tourism. Nashik also has another airport namely Gandhinagar airport. There is a military airport in Deolali cantonment.

2.7) IRRIGATION:-

Water is the most important single requirement for the growth of plants. Crops can be raised successfully only if water is available in adequate quantity.

Irrigation is one of the important inputs and socioeconomic basis of agriculture. It is SINE QUA NON for intensive and more economic agricultural operation. The success of agriculture depends to a large extent on how successfully water requirements of various crops are met (Arora, 1976) Availability of perennial water or irrigation encourages Farmers to adopt more scientific techniques and intensive cultivation. “Farming Without irrigation is very limited and if rainfall decreases to less than 300 m. m., agriculture is impossible without irrigation” (King, 1953).
Irrigation helps to augment yield per unit area and increase the cropped land through the transformation of agriculture and increasing production, agriculture offers new opportunities for employment. “Due to irrigation, farmers can make additional investments in cattle, farm implements, on more valuable crops and the total employment of farmers and labors” (Gadgil, 1945). Obviously it increases the land value and leads to additional use of land. Thus irrigation plays a vital role, particularly in changing the agrarian structure from subsistence to commercial. An attempt is made to highlight the spatial pattern of irrigation facilities in the district.

Irrigation and irrigational facilities have become more and more significant in the agriculture development, especially in Nashik district, where the monsoonal variations, both the intensity and period are prone to fluctuations; irrigation assumes a very vital role in agricultural performance and planning. Most of the central and eastern parts of the study area show fluctuations in rainfall and its distribution and are periodically under severe drought conditions. These and even the western part therefore need irrigation on a massive scale, if steady agricultural production is the aim.

Irrigation is artificial supply of water for growing crops and it has been practiced in India since time immemorial. For successful farming, irrigation is essential in one form or the other particularly in the areas receiving scanty rainfall. In many less developed countries areas receiving a well distributed rainfall of 750 mm. or more, conducive to high level crop production are relatively rare (Hoyles, ed, 1974).

Availability of irrigational facilities will not only ensure a sustained Kharif agriculture production, but will enable enterprising farmers to take up Rubbi production on a reasonable scale. The uncertain or fluctuating rainfall and the ever changing crop production could then be successfully tackled. However, in the study area extension and development of irrigation facilities are not commensurate with planning processes and the actual performance. It is thus a prime need to extend the irrigational facilities. This will result in an all-round development of agriculture and other allied activities.
There are two main sources of irrigation.

1) SURFACE IRRIGATION:

Rivers, canals, tanks, ponds, lakes and artificial reservoirs provide surface water for irrigation. Canals are drawn from dams constructed across the rivers and if the dam is high enough to form a large reservoir, water is available throughout the year. Tanks which form an important source of irrigation are mostly rain-fed. The water from the artificial source is carried to the fields by flow due to gravity. In the reference year 1991 surface irrigation was 25.06% and it was 24.10% in the reference year 2011.

2) WELL IRRIGATION (Ground Water):

The nature of topography and the characteristics of geological formations influence the amount of underground water available. The subterranean water is tapped by digging wells. The depth of these wells vary with the nature of underlying beds and the level of permanent water table. From this source water has to be lifted before it is used for irrigation and various water lifting devices have to be applied. The appliances to lift water worked by human or bullock power in the district are Mhote and Rahat (Persian wheel). Nowadays oil engines and electric pumps are most common.

The district has 25.70% area under irrigation of the net sown area in the reference year 1991. The area under irrigation decreased in the year 2011 i.e. 17.80% percent.

Other sources of irrigation occupied a very significant position i.e. 24.90% in the reference year 1991 and the irrigated area by other sources decreased in the reference year 2011. It was only 6.08% percent.

Table No.: 2.7

<table>
<thead>
<tr>
<th>Category</th>
<th>1991</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well irrigation</td>
<td>49.5</td>
<td>69.82</td>
</tr>
<tr>
<td>Surface irrigation</td>
<td>25.6</td>
<td>24.10</td>
</tr>
<tr>
<td>Other</td>
<td>24.9</td>
<td>6.08</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
IRRIGATION PROJECTS IN THE DISTRICT:-

Planning for irrigation development is done at central and state government levels. For the optimum utilization of water potential of the river basins, three types of irrigation projects are planned.

1. MAJOR PROJECTS

2. MEDIUM PROJECTS

3. MINOR WORKS

A major project in a river basin alone cannot exploit all the water potentials of the basins. Therefore, to bring maximum area under irrigation, medium and minor works are also planned along with the major works. The following important irrigation projects and major works play an important role in developing the agriculture of the district. (Fig. No. 2.6)

Table No. 2.8 MAJOR IRRIGATION PROJECT IN NASHIK DISTRICT

<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Location of project</th>
<th>Maximum Storage(in millimeter)</th>
<th>Irrigable area completed project in (half)</th>
<th>Area irrigated at present (in Hect.)</th>
<th>perennial</th>
<th>Seasonal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gangapur</td>
<td>Gangawadi(NSK)</td>
<td>215.80</td>
<td>15960(H)</td>
<td>1558</td>
<td>23095</td>
<td></td>
</tr>
<tr>
<td>Chankpur</td>
<td>Chankpur (KAL)</td>
<td>79.92</td>
<td>13365(H)</td>
<td>977</td>
<td>4258</td>
<td></td>
</tr>
<tr>
<td>Panzan</td>
<td>Panzan (NAND)</td>
<td>524.0</td>
<td>3347(H)</td>
<td>------</td>
<td>1043</td>
<td></td>
</tr>
<tr>
<td>Karanjwan</td>
<td>Karanjwan (DIN)</td>
<td>175.56</td>
<td>1574(H)</td>
<td>------</td>
<td></td>
<td>------</td>
</tr>
<tr>
<td>Waghad</td>
<td>Waghad (DIN)</td>
<td>76.48</td>
<td>6750(H)</td>
<td>------</td>
<td>1451</td>
<td></td>
</tr>
<tr>
<td>Ozarkhed</td>
<td>Ozarkhed (DIN)</td>
<td>67.96</td>
<td>10400(H)</td>
<td>------</td>
<td>2260</td>
<td></td>
</tr>
<tr>
<td>Palkhed</td>
<td>Palkhed (DIN)</td>
<td>21.24</td>
<td>59400(H)</td>
<td>5278</td>
<td>7585</td>
<td></td>
</tr>
<tr>
<td>Darna</td>
<td>Darna (IGET)</td>
<td>226.79</td>
<td>33170 (H)</td>
<td>2931</td>
<td>2217</td>
<td></td>
</tr>
</tbody>
</table>
Table No. 2.9  MEDIUM IRRIGATION PROJECTS IN NASHIK DISTRICT

<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Location of project</th>
<th>Maximum Storage(in millimeter)</th>
<th>Irrigable area completed project in (half)</th>
<th>Area irrigated at present (in Hect.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daraswadi</td>
<td>Pimpaled(CHAN)</td>
<td>3.14</td>
<td>840(H)</td>
<td>----- 150</td>
</tr>
<tr>
<td>Bhajapur</td>
<td>Bhajapur (SINN)</td>
<td>21.62</td>
<td>4580(H)</td>
<td>----- 1861</td>
</tr>
<tr>
<td>Mosam</td>
<td>Wadel (MALE)</td>
<td>----</td>
<td>3150(H)</td>
<td>----- 530</td>
</tr>
<tr>
<td>Haranbari</td>
<td>Ambapur (BAG)</td>
<td>37.78</td>
<td>9726(H)</td>
<td>----- 6159</td>
</tr>
<tr>
<td>Kelzar</td>
<td>Kelzar (BAG)</td>
<td>17.23</td>
<td>3640(H)</td>
<td>----- 1651</td>
</tr>
<tr>
<td>Alandi</td>
<td>Sakotewadi(NSK)</td>
<td>40.60</td>
<td>2916(H)</td>
<td>----- 2916</td>
</tr>
</tbody>
</table>

Source: - Irrigation Department, Nashik Division.

GODAVARI PROJECT:-

The Godavari project is an important project of the district. It has long been under the consideration of the government. It has now been matured as a scheme for irrigation on the right bank of the river from Nandur Madhameshvar to Rahata. The weir will be of Mosonry. It will be half a mile long and thirty feet high on a rocky barrier in the river-bed and the canal will be a hundred miles long. It will protect an area of about 56000 hectares (1, 40,000acres) almost wholly in that part of the Deccan, which is especially liable to suffer from drought. It is built across the Godavari.

PALKHED CANAL:--

The large works, which are under the Public Work Department, are the Palkhed canal in Dindori and Niphad entirely new scheme. The Vadali canal in Niphad, the Ozar Tambat canal in Dindori and Niphad, an old scheme improved and enlarged. The Palkhed canal in supplied from the Kadwa River. The weir and head works are of rubble masonry.

The wall, which is twenty feet high at the center and eight hundred feet long, is built on a rocky barrier in the river about 30 k.ms. above its meeting the Godavari. The canal, which is 18 k.ms. long, lies on the right bank, and with 15 k.ms. of side
channels, commands an arable area of about 8000 hectares (20000 acres) in Dindori and Niphad. The work was begun in 1968, but on account of two accidents due to excessive floods, it was not opened till 1973-74. The total cost was Rs. 1, 48,720. The discharging capacity at the head is 63 cubic feet a second. The river has a large and never failing supply for six months.

FIG. NO. 2.3: IRRIGATION PROJECTS

VAGHAD AND KHIRDI RESERVOIRS:-

The Vaghad and Khirdi reservoirs were begun in 1978 as famine relief work. The Vaghad reservoir is 20 k.ms. north of Nashik. It is now completed, but the work of the Khirdi reservoir, 12 k.ms. from Yeola has been stopped for want of funds. The Vaghad reservoir is designed to store rain water for the canals below. It consists of an earth dam across the Kadva River. It is 4160 feet long and 90 feet high at the center. The dam impounds 625 million cubic feet of water within an area of 320 hectares (800 acres), Water, when required, will be let out by a masonry culvert and will flow...
along the channel of the river to the Palkhed, Vadali and Ozar Tambat canals to aid their supply. The work will cost about Rs. 2, 27,500 and by a further expenditure of about the same amount can be made of twice its present capacity. The design of the Khirdi reservoir is to build an earthen dam, 2465 feet long and 49 feet high across the Narindi River. The estimated cost is about Rs.1, 33,100.

GANGAPUR DAM:-

This Earthen dam is situated near Gangapur village, 15 k.ms. to the north – west of Nashik city. It is built at the confluence of the Godavari and the Kashyapi rivers. It is 12500 feet long and 145 feet high from the base and 30 feet wide. The first stage of this work was completed in 1961 at a cost of Rs.361.57 lakh. The second stage was completed in 1965-66. Its storage capacity is 215.80 million M. feet with a catchment area measuring 138 sq. miles. It has two canals, viz. the right bank canal and the left bank canal with a total length of 25 k.ms. and 45 k.ms. respectively. The right bank canal commands a gross area of 4400 hectares and the left bank canal 13200 hectares.

GIRNA DAM:-

The dam is built across the river Girna near Panzan village in Malegaon taluka. This is the biggest dam in the district. The catchment area of the dam measures about 730 hectare. But this dam is not useful for Nashik district.

NANDUR MADHAMESHWAR PROJECT:-

It is situated near the village Nandur Madhameshwar, a bandhara has been built on the confluence of the Godavari and the Kadava rivers. However, most of the area in Ahmednagar district is benefitted by the project. It is one of the oldest irrigation projects in the district.

DARNA DAM:-

This project was completed in 1915-16. It envisaged the construction of a gravity dam across the river Darna, about 25 k.ms. South of Nashik city. Below the dam 65 k.ms. away is a pickup weir at Nandur Madhameshwar from which two canals viz. the Godavari left bank and Godavari right bank, take off. The dam has a storage capacity of about 226.79 million M. ft.
The Godavari left bank canal emanating from the above weir has a culturable area of 35200 hectares under its commands which falls in Niphad and Yeola talukas of the district.

The Godavari right bank canal takes off from the Nandur Madhameshwar weir and is about 95 k.m.s. long. It has the irrigated area of 33170 hectares under its command. It falls in Niphad and Sinnar talukas of the district.

**CHANKAPUR PROJECT:-**

The project was completed in 1911 at the cost of Rs.17, 69,596. A dam is constructed across The Girna River near Chankapur village in Kalvan taluka. About 35 k.m.s. below the Chankapur dam is a pick-up weir at Thengode village in Baglan taluka. Two canals i.e. The Girna right bank and the Girna left bank take off from this weir. At present the dam has a storage capacity of 1056 m. cu. ft.

The Girna left bank canal is 30 k.m.s. long. It takes off from the Thengode weir. It has an irrigable area of 13365 hectares, all of which falls in Malegaon taluka. The Girna right bank canal also takes off from Thengode weir. Its total length is 10 k.m.s. and has 600 hectares under its command. The whole area falls in Malegaon taluka.

**HARANBARI DAM:-**

This dam is situated near the village Ambapur. It is built across the river Mosam. There are two canals i.e. the Mosam right canal and Mosam left canal. The dam has a storage capacity of 37.78 mm. and irrigates an area of 9726 hectares.

**MOSAM RIGHT BANK CANAL:-**

A medium size Bandhara has been constructed across the Mosam River near the village Vadel. The construction work of the bandhara and the canal was started in 1956-57 and completed in 1962-63. The total outlay on this project was of the order of Rs.34, 18,000. From the bandhara a canal 10 k.m.s. in length and distributaries 15 k.m.s. long has been constructed. They together cover all villages and the area expected to be brought under wet crop is 3150 hectares. (Fig. No. 2.4)
Nashik district has many minor projects, bandharas and tanks which are useful for irrigation. There are Parsul tank, Khirdi tanks and the Khad tanks and a number of other small tanks existing in the district. By the end of 1981, there were 35 major tanks in the district. In the first five year plan 12 bandharas, in the second 7 bandharas and in the third 3 bandharas were constructed. They together irrigated an area of 530 hectares.

IRRIGATION AND CROPPING PATTERN:-

WALDEVI DAM:-

Waldevi Dam, is an earth fill dam on the Waldevi River near Nashik in the state of Maharashtra in India. The height of the dam above its lowest foundation is 36.4 m (119 ft.) while the length is 1,890 m (6,200 ft.). The volume content is 1,304 km$^3$ (313 cu mi) and the gross storage capacity is 33,720.00 km$^3$ (8,089.86 cu mi). The main purpose of this dam is irrigation.

DHANER DAM-

Dhaner Dam is a gravity dam on Tapi river near Nandgaon, Nashik district in the state of Maharashtra in India. The height of the dam above the lowest foundation is 27.7 m (91 ft.) while the length is 425 m (1,394 ft.). The gross storage capacity is 141,000.00 km$^3$ (33,827.70). The main aim is to provide water in the local area.

KADWA DAM:-

Kadwa Dam, is an earth fill dam on Kadwa River near Igatpuri, Nashik district in the state of Maharashtra in India. It is situated in Igatpuri tehsil. The height of the dam above the lowest foundation is 31.84 m (104.5 ft.) while the length is 1,660 m (5,450 ft.). The volume content is 1,245 km$^3$ (299 cu mi) and gross storage capacity is 59,590.00 km$^3$ (14,296.40 cu mi). The purpose of this dam is irrigation.

KASHYPI DAM:-

Kashypi Dam, is an earth fill dam on Kashyapi River near Rajapur, Nashik district in the state of Maharashtra in India. The height of the dam above the lowest foundation is 41.75 m (137.0 ft.) while the length is 1,291 m (4,236 ft.). The volume content is 2,761 km$^3$ (662 cu mi) and gross storage capacity is 52,690.00 km$^3$ (12,641.00 cu mi).
Downstream this dam is the Gangapur Dam, which opened in 1965. Due to silt deposition in the reservoir area, the storage capacity of the Gangapur Dam has gradually reduced. The right side canal running towards Nashik is also closed due to the high civilization in the area. For these two reasons, the Kashypi Dam was constructed. The purpose is of this dam also is irrigation.

PUNAD DAM:-

Punad Dam, is an earth fill dam on Punad River near Nashik. The height of the dam above the lowest foundation is 29.62 m (97.2 ft), while the length is 1,820 m (5,970 ft). The volume content is 123 km³ (30 cu mi) and gross storage capacity is 19,080.00 km³ (4,577.54 cu mi). The purpose of the dam is mainly for irrigation.

BHAVALI DAM:-

Bhavali Dam, is an earth fill dam on Bham River near Igatpuri, Nashik district in the state of Maharashtra in India. The height of the dam above the lowest foundation is 33.97 m (111.5 ft) while the length is 1,550 m (5,090 ft). The volume content is 329 km³ (79 cu mi) and gross storage capacity is 75,050.00 km³ (18,005.45 cu mi).

ALANDI DAM:-

Alandi Dam, is an earth fill dam on Alandi River in Nashik district in the state of Maharashtra in India. The height of the dam above the lowest foundation is 29.3 m (96 ft.), while the length is 1,690 m (5,540 ft.). The volume content is 2,782 km³ (667 cu mi) and gross storage capacity is 29,600.00 km³ (7,101.42 cu mi).[1]

MUKANE DAM:-

Mukane Dam, is an earth fill dam on Aaundha River near Igatpuri, Nashik district in the state of Maharashtra in India. The height of the dam above the lowest foundation is 26.93 m (88.4 ft.), while the length is 1,530 m (5,020 ft.). The volume content is 2,271 km³ (545 cu mi) and gross storage capacity is 214,160.00 km³ (51,379.72 cu mi). The purpose of the dam is drinking water supply as well as irrigation.
NAGYASAKYA DAM:-

Nagyasakya Dam, is an earth fill dam on Panzan River near Nandgaon, Nashik district in the state of Maharashtra in India. The height of the dam above the lowest foundation is 23.09 m (75.8 ft.), while the length is 1,440 m (4,720 ft.). The volume content is 292 km$^3$ (70 cu mi) and gross storage capacity is 15,620.00 km$^3$ (3,747.44 cu mi). The purpose is also for drinking water supply and irrigation.

NAVDURI DAM:-

Nanduri Dam, is an earth fill and gravity dam on Tapi River near Ama Local Nallaher, Nashik district in the state of Maharashtra in India. The height of the dam above the lowest foundation is 20 m (66 ft.), while the length is 2,186 m (7,172 ft.). The volume content is 1,381.25 km$^3$ (331.38 cu mi) and gross storage capacity is 42,056.00 km$^3$ (10,089.77 cu mi). The purpose is irrigation.

The water requirements of crops differ widely and for a given type of soil the amount of water required varies with the type and makeup of crops. They depend mainly on the plant species, and its physiological and the growing season. Most of the crops require larger quantities of water during later stages of growth than in early stages. Grain crops require maximum irrigation during the time earthed are forming. Many annual crops do not require irrigation, in their maturity stage. Sugarcane requires heavier irrigation, or more frequent irrigation from seven to eight months onwards. In the case of many fruit trees, irrigation has to be stopped during their resting period.

Among the irrigated crops sugarcane and cotton are more significant as they have a very high proportion of the area occupied by these crops under irrigation. It means that in the district sugarcane and cotton entirely depend upon irrigation pm. The areal spread of these two crops may be insignificant if compared to that of cereals, but they are economically more important. Next to Sugarcane and Cotton, Wheat Jowar, Vegetables and fruits, exhibit a higher proportion of their area under irrigation. Rice, Bajara, oilseeds and other nonfood crops account for a relatively smaller irrigated area.
ANALYSIS OF IRRIGATION LAND:-

An analysis of the temporal variation in the irrigated area under different crops reveals an overall increase in the last two decades. The increase is spectacular in case of cotton, high in case of wheat and sugarcane, and moderate in rice and oilseeds. Bajara has neither gained much nor are the losses in its area under irrigation. Thus the maximum increase is realized in cotton, sugarcane, fruits and vegetables, which are cash crops. With the exception of wheat, other food crops have shown a steady increase from 1981 and 1991 onwards.

One may conclude that within a given a setup of environmental factors, the future of agricultural development lies in the optimum utilization of available water resources. Irrigation can promote the efficiency of agriculture through increase in the crop yields. The total agricultural production can be busted by taking two/three crops in a year, with the application of water in the seasons other than monsoon. Irrigation may also bring about changes in cropping patterns resulting into an increase in the farmer’s income and standard of living in the district.

2.8) POWER SUPPLY (ELECTRICITY):-

Nowadays the availability of electricity in talukas of the district is considered to be a prime need for the development of agricultural utilization and overall progress of the study area. It has direct bearing on the efficiency of irrigation and in turn economic returns from the irrigated farms. Utilization of electric power has become a sign of efficiency of man in various fields.

Electricity is provided to the villages of the district by M.S.E.B. since the year 1965. After the establishment of this board, the process of electrification has accelerated. Authentic information received from the concerned officer clearly reveals the fact that 99 percent villages of the Nashik district have been electrified.

The number of electrified towns in the district was only eleven (11) in the reference year 1951. No village was electrified up to the end of March 1961. The population of these electrified places was 23.28 percent of the total population of the district. The per capita consumption was naturally lower than the state average, as only 11 towns in the district had been electrified. The electric supply in the district
was from the five private concerns and one municipal power house. Out of these six stations of Yeola, Malegaon, Manmad, Nashik, Deolali and Sinnar were running on diesel oil, while the electric supply company of Igatpuri gets supply from the power station of the central railway at Kaylan.

After the establishment of Maharashtra state Electricity Board, Nashik was an independent Divisional office to look after the implementation of the schemes of electric supply in the district. There was fast development in power supply after 1965.

A temporal analysis of villages which have been electrified before 2011 clearly pointed out the following views.

Nearly 1579 villages were electrified before 1991. These villages occur especially in the central and eastern part of the district. Other villages which were electrified in the same period belong to Dindori and Igatpuri talukas. The highest percentage of villages which were electrified in between the period of 1971 and 1991 nearly 85 percent villages were electrified in that period.

Thus up to the year 2011 nearly 90 percent villages are electrified except some villages of the western a talukas. Majority of the villages were electrified. Remaining un electrified villages were electrified later on because such villages occur in hilly areas of the western part and they are situated far away from the major transportation systems of the district.

Electric power supply plays an important role in the development of agriculture. After the establishment of M.S.E.B. the percentage of irrigated land is increased only because of electric supply provided to the farmers.

2.9) MARKETING:-

Agriculture geography, which is an important branch of geography, studies spatial variations in agriculture and nowadays the definition is extended to cover all the agriculture activities from sowing and harvesting to marketing. Surplus and exchange are two important aspects of modern commercial economy. So it is very important to understand the spatial distribution of market centers and surrounding
area of the market centers. In the rural areas, agricultural commodities dominated the goods traded at the market centers.

A weekly market is the central economy institution in most rural areas particularly in the developing economies (Diddee, 1978). In the countryside where most settlements are purely agricultural, the weekly markets perform important economic and social functions. Weekly markets essentially are distributing rather than collecting centers, for significant volumes of agricultural produce flow only through the largest weekly markets and regulated markets.

The spatial distribution of weekly markets is influenced by physiography, population density, agricultural productivity and accessibility. Generally most weekly markets are not more than 4 to 10 k.ms apart and the range is also governed by the round trip distance people can walk in a day. The sequence of market days is adjusted to reduce competition as far as possible among the neighboring villages.

The distribution of markets is uneven in the western hilly area with high rainfall. Market centers are absent on account of low marketable surpluses, low population density, poor accessibility and low purchasing power of farmers (Surgana, Peint and Igatpuri) In the central part of the district or in irrigated area the number and size of weekly markets are increased. (Niphad, Baglan, Malegaon etc.)

In the district, market is held only in 270 villages. It is also observed that in four talukas namely Peint, Surgana, Dindori, Nandgaon, Yeola and Igatpuri very few villages have this facility. Among the 1460 villages where market is not held the same is available at a distance of up to five k.ms. for 460 villages, 5 to 10 k.ms, for 695 villages and beyond 10 k.ms. Mostly weekly markets are found in the villages below five thousand population. Krushi Utpanna Bajar committee plays a dominant role for agricultural production. Because of the market committee farmers sell the agricultural production directly in the market and get more profit.
REFERENCES

13. Socio- Economic Review And District Statistical Abstract of Nashik