



RESEARCH PAPER

Water Resources and their Utilization for Irrigation in Agra District

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ABSTRACT

Water is the liquid that descends from the clouds as rain, forms streams, lakes and seas and is a major constituent of all living matter and that is an odorless, tasteless very slightly compressible liquid oxide of hydrogen H₂O which appears bluish in thick layers freezes at 0°C and boils at 100°C has a maximum density at 4°C and a high specific head conductor of electricity and a good solvent. Water is of supreme importance to man, providing focal points for habitation, water for cultivation and a venues of travel, water power and recreation. The action of artificially supplying land with water to help the growth and productivity of plants. Canal is a artificial water course constructed for water supply and irrigation to unite rivers, lakes etc for purpose of inland transport. The district of Agra lies between latitude 26° -44' to 27° -24' North and longitude 77° -28' to 78° 54' East. It is bounded in the north by Mathura, Etah, Firozabad districts and in the south by the Morena and Bhind districts of Madhya Pradesh, in the east by Firozabad, Mainpuri and Etawah districts and in the west by Bharatpur and Dholpur district of Rajasthan. The Study is based on the 15 blocks of Agra district viz. Achhnera, Akola, Bichpuri, Barauli Ahir, Khandauli, Etmadpur, Fatehpur Sikri, Jagner, Kheragarh, Sainyan, Shamsabad, Fatehabad, Pinahat, Bah and Jaitpur Kalan. The researchers have tried to study the water resources and their utilization and conservation in all the 15 blocks for water management. The present paper is devoted to the main purpose of water utilization and conservation in the district of Agra. Our purpose is to utilize maximum existing water and to conserve without wasting it. The present study is based on primary and secondary data. The researcher has collected primary and secondary data from every block regarding water resources and their utilization. In the district of Agra main water resources are rivers, canals, wells, tube wells, Tanks and reservoirs etc. The most prominent Water resources in the district are the river Yamuna and its tributaries– the Chambal, the Utangan along with their numerous other minor streams viz. Jhirna, Khari etc. Irrigation is the artificial application of water to land for agriculture to prosper, it is important for the crops to get water at the right time. Agra is an agricultural district and need water at the right time for the proper growth of its crops. Irrigation is important for cultivation in semi-arid parts of the district such as Fatehpur Sikri, Achhnera and Akola blocks. Tube wells, wells, Canal, Tanks, Jhils, Pokhar (Small lakes) and rivers are the source of irrigation in the district of Agra. According to the Sankhydiya Patrika-2015, In the district of Agra 252585 hectare land is net irrigated and 279715 hectare land is gross irrigation. Out of which 229199 hectare land is irrigated by tubewells (Public and Private), 21875 hectare land is irrigated by canals and 1448 hectare by well, 38 hectare land and 25 hectare land irrigation by Ponds and other source. Fatehpur Sikri and Achhnera blocks have maximum irrigated land 25696 and 23352 hectere whereas Bichpuri block has least irrigated land i.e. only 6858 hectare.

Key words: Water Resources, Utilization, Irrigation

INTRODUCTION

Water is the liquid that descends from the clouds as rain, forms streams, lakes and seas and is a major constituent of all living matter and that is an odorless, tasteless very slightly compressible liquid oxide of hydrogen H₂O which appears bluish in thick layers freezes at 0°C and boils at 100°C has a maximum density at 4°C and a high specific head conductor of electricity and a good solvent. Water is of supreme importance to man, providing focal points for habitation, water for cultivation and a venue of travel, water power and recreation. Water circulates between the land, sea and atmosphere. Ground Water plays an important role of natural water storage. Spring is simply an outlet for such water. Well is a deep hole usually cylindrical or a shaft dug in the ground to obtain water. River is a general term applied to a natural stream of water flowing regularly or intermittently over a bed, usually in a definite channel toward the sea, a lake, or an inland

depression in a desert basin or a marsh or another river. The action of artificially supplying land with water to help the growth and productivity of plants. Canal is a artificial water course constructed for water supply and irrigation to unite rivers, lakes etc for purpose of inland transport.

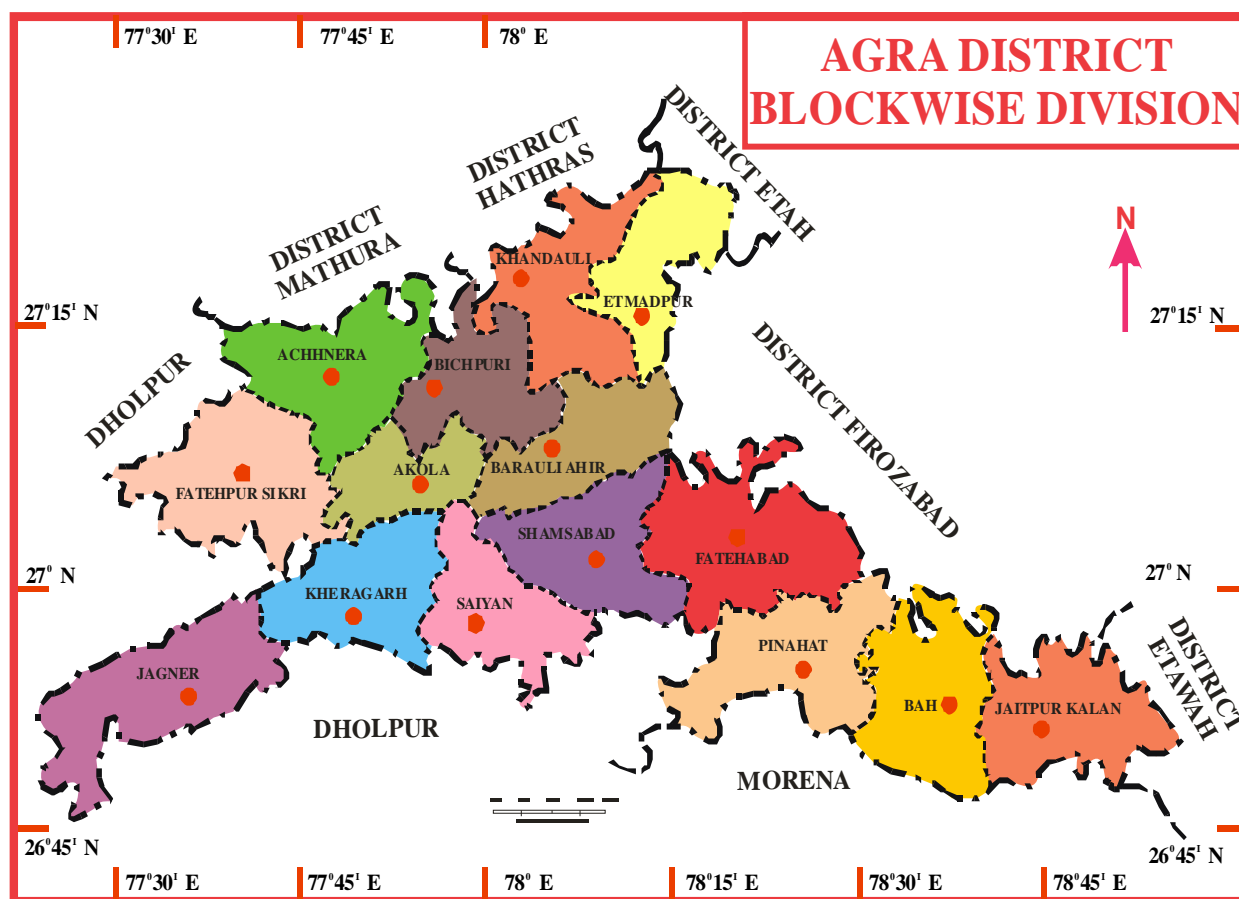
STUDY AREA

Agra District is a part of Brij Mandal. It was one of the twelve groves of Brij Mandal. In ancient days the area was known as "Agarvan" where Lord Krishna used to play . The name was given after Agarwan as Agar. The soil of this area is Grakish nature and it is a Salt Pan which is known 'Agar' in Hindi. Therefore, the name of district is Agra after the name of the soil 'AGAR'.

The district of Agra lies between latitude 26°-44' to 27°-24' North and longitude 77°-28' to 78°54' East. It is bounded in the north by Mathura, Etah, Firozabad districts and in the south by the Morena and Bhind districts of Madhya Pradesh, in the east by Firozabad, Mainpuri and Etawah districts and in the west by Bharatpur and Dholpur district of Rajasthan.

The Study is based on the 15 blocks of Agra district viz. Achhnera, Akola, Bichpuri, Barauli Ahir, Khandauli, Etmadpur, Fatehpur Sikri, Jagner, Kheragarh, Sainyan, Shamsabad, Fatehabad, Pinahat, Bah and Jaitpur Kalan. The researchers have tried to study the water resources and their utilization and conservation in all the 15 blocks for water management.

Fig. 1: Agra District Map: Blockwise Division



PURPOSE OF THE STUDY

The present paper is devoted to the main purpose of water utilization and conservation in the district of Agra. Our purpose is to utilize maximum existing water and to conserve without wasting it. It is essential to conserve water for future generations and economic uplift of present generation. It will increase the production of cereals and the supply of cereals for a long time will be ascertained.

METHODOLOGY

The present study is based on primary and secondary data. The researcher has collected primary and secondary data from every block regarding water resources and their utilization.

WATER RESOURCES OF AGRA DISTRICT

In the district of Agra main water resources are rivers, canals, wells, tube wells, Tanks and reservoirs etc.

1. RIVER:

The most prominent Water resources in the district are the river Yamuna and its tributaries– the Chambal, the Utangan along with their numerous other minor streams viz. Jhirna, Khari etc.

- a. **THE YAMUNA:** The Yamuna, the chief river of the district, is personified in Hindu mythology as "Suryatanaya" (the daughter of Surya), Yamasvasa, the sister of Yama (the lord of death) one of the wives of Krishna. ⁽³⁾ Another popular name of this river is Kalindi. It is said that Rishi Agastya underwent his penances and austerities on the bank of river Yamuna, the king Bharat performed sacrifices of above 300 horses and Shantanu held 7 big sacrifices and Sahadeva distributed lakhs of the gold coins. The total length of the river in Agra district is approximately 233 kms and the velocity of the river three km per hours but in rainy season it reaches 12 km. The course of Yamuna is marked by a wide belt of calcareous ravines which get steeper and wider as it runs towards west to east, only a break being a nine km length near the Etmadpur Madra.
- b. **JHIRNA:** A tributary of Yamuna is known as Jhirna or Karwan which meets Yamuna in the north of Agra city. The stream enters in the district near the village Naharria in Etmadpur tahsil. The area of this stream is covered by ravines when it enters in the district, normally the river dries in summer season but in rainy season it is flooded.
- c. **UTANGAN:** The Utangan or Banganga is the only southern tributary of the Yamuna. It enters in the district in the south western corner of tahsil Kiraoli, near the village Sarauli. It separates the tahsil of Bah and Fatehabad and joins the Yamuna near Rihawali village, 16 km east to Fatehabad. The main characteristic of this river is that it has a shallow bed of shingle and sand. ⁽⁴⁾ In 1848 a channel was made near the village of Sarauli in Kiraoli tahsil for dividing the waters of Fatehpur Sikri canal but the river eroded a new way in to the Khari River. The main affluents of Utangan are Kawar, Chulhji, Loheuri and Jhanjhan. The river Parvati joins the Utangan in the south of tahsil Kheragarh.
- d. **KHARI:** The River Khari is the only feeder of river Utangan. It enters the district of Agra from south west of Fatehpur Sikri. After flowing from the dam, 'Terah'. More at Fatehpur Sikri, it proceeds towards the east, near the village Singarpur. It turns south east and passing the village of Janegara and Akola in tahsil Kiraoli, makes the boundary between the tahsil of Kheragarh on the south and those of Fatehabad and Agra on the north. It finally meets the Utangan at the village of Motipura in tahsil Fatehabad. During the rainy season, it is swollen by floods but in summer it shrinks to only a ribbon of water. The river of village Gothara and the river of village Chiksana (Bharatpur) are two main affluent of this river.
- e. **CHAMBAL:** The river of Chambal originates in the northern slopes of the Vindhyas from Mhow. In the district of Agra, it enters from the extreme west of tahsil Bah near village Tasord. The river flows along the boundary of Agra-Etawah in south-east. During the rainy season it is fed by many torrents and the river becomes very wide and turbulent stream but in summer it shrinks to a thread of water winding along a sandy bed. Its velocity varies from three to nine kms an hour according to season and is not navigable because of its nature.

2. CANAL:

Akbar the great was the first king who first constructed a masonry dam connecting two rocky ridges near. Fatehpur Sikre which formed a huge lake in the rains. In course of time, this dam fell

into disrepair and neighbouring villages suffered considerably from the consequent want of water. In 1818 the idea of irrigating this tract by means of an inundation canal fed by the Utangan was conceived and the district of Agra is served by the Ganga and the Agra Canals, the Ganga Canal cover the Trans- Yamuna, tahsil of Etmadpur and the Agra Canal the tahsils of Agra, Kiraoli, Kheragarh and Fatehabad.

- i. The Ganga Canal was constructed in 1912. This canal (at present) irrigation tahsil of Etmadpur. The area irrigated in 2010-11 was 13895 acres of which 2650 acres were irrigated in Kharif and 11175 acres in Rabi.
- ii. Agra Canal construction was taken up in the terrible drought year of 1868 when the famine-stricken areas of the districts of Agra, Mathura and Gurgaon, where wells were deep and brackish and no other means of irrigation existed, had to be protected urgently. It was declared open in 1874 and was completed in March 1891. The Canal terminates at Jodhpur on the boundaries of the Agra and the Mathura districts from which point it separates into three distributaries the Agra, the Terminal and the Sikandra which irrigate the district. There is also a fourth channel at the tail of the Agra branch, known as the Kitham escape which drains the surplus water into the Kitham lake.

The district of Agra is irrigated by the following four distributaries of the Agra canal-

- a. **FATEHPUR SIKRI BRANCH:** This canal enters Agra district just beyond it's 11th mile and tail off at mile 93 km after traversing tahsil Kiraoli in a south easterly direction and crossing the Khari nadi and irrigating the tract between that river and the Utangan in the Kiraoli and Kheragarh tahsils. It gives off three minors, the Hansela Garhiman and Singarpur and an escape, the Daulatabad. The total length of the system of this branch is 320 km and the head discharge is 545 cusecs. The cultivated area commanded by this branch is 150898 acres and the area irrigated by it in is 71318 acres of which 27769 were in Kharif and 43549 in Rabi.
- b. **AGRA DISTRIBUTARY:** This takes off at the 160 km of the main canal and after traversing through tahsil Kiraoli tails off in tahsil Agra. The length of the system is 29.5 km and the head discharge is 47 cusecs. The cultivable area commanded in 2015 was 12151 acres, the area actually irrigated being 7058 acres of which 3096 acres were irrigated in Kharif and 3962 in Rabi.
- c. **TERMINAL DISTRIBUTARY:** It enters Agra district in the northern part of tahsil Kiraoli, this channel passes through the middle of tahsil of Agra and after passing Bichpuri, Malpura, Dinger and Fatehabad, it tails off at 64 km. The length of the system is 126 km, the head discharge is 239 cusecs, the culturable command area is 62882 acres and the total irrigated area in 2015 was 29774 acres (10201 acres in Kharif and 19573 in Rabi). Between the 22-23 km., it gives off the small Malpura minor and a km. further on the Iradatnagar distributary which has a length of 29 km. and irrigates the southern portions of the tahsil of Agra and Fatehabad.
- d. **SIKANDRA DISTRIBUTARY:** This also takes off from the tail of the main canal and was actually the old navigation channel which was closed to navigation in 1904. The present channel almost follows the course of the old one running almost due east part Sikandra and tailing off into the Yamuna to the north of the city of Agra at 24 km. Its present length and head discharge are 30 km. and 50 cusecs respectively and culturable are commanded in 8784 acres. In 2015, it irrigated 4856 acres of which 1977 acres are irrigated in Kharif and 2879 acres in Rabi.

3. WELL:

Well plays an important part and irrigate more than one third of the irrigated area of the district. The practicability of irrigation by well in some particular regions or regions depends on the amount of the sub soil water, the depth at which it is found, its quality and the nature of strata. Water is nearest the surface in southern Kheragarh and south west Kiraoli and deepest in eastern Bah. The level fluctuates with the season but it always very low in the high lying tracts above the Yamuna.

4. TUBE WELL:

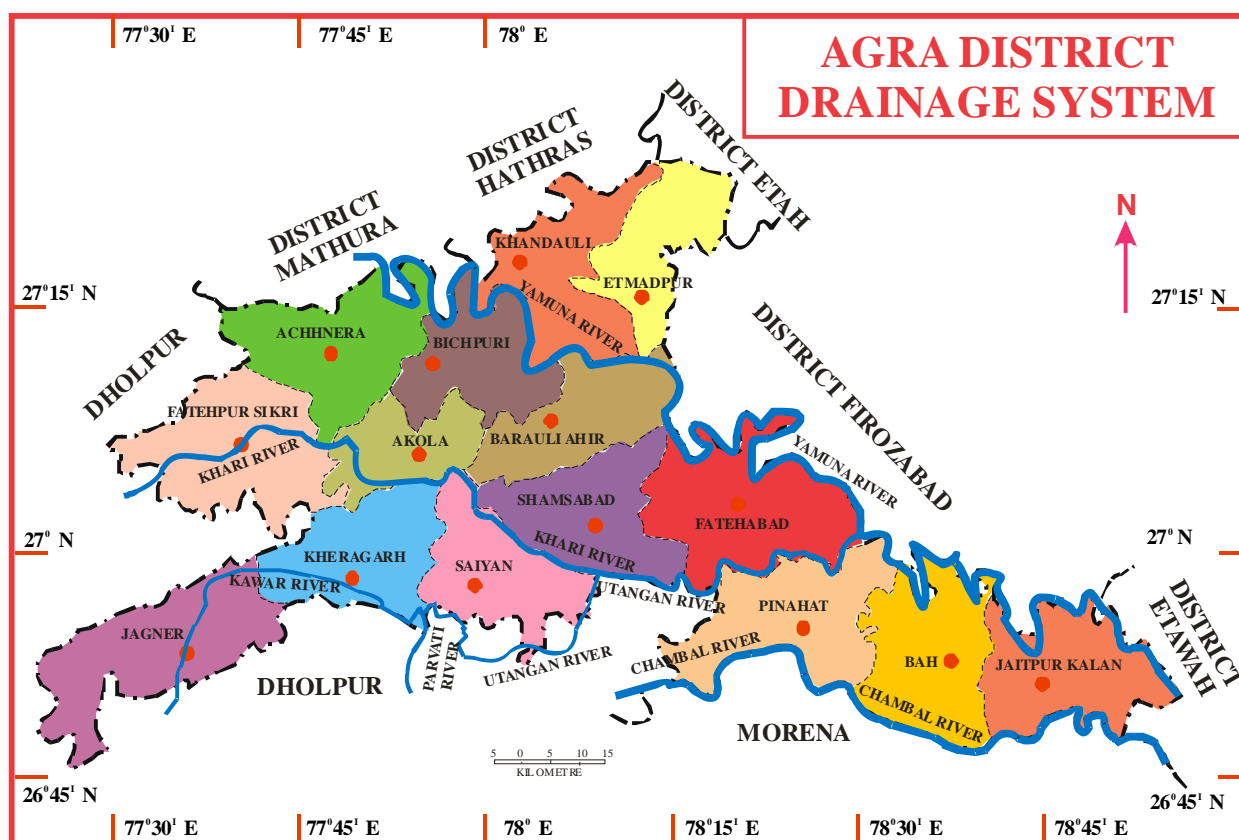
A Tube well is a very deep bore dug into ground with a drilling machine and the water is pumped out with the help of electricity. In April 1955 there was only one tube well in Agra Tahsil for irrigation purpose. As per Sankhikiya Patrika- 2015, there are 68110 tube well in the district. Barauli Ahir block has 8513 tube wells and Fatehpur Sikri has 8090 tube wells. Jaitpur Kalan has minimum tube wells i.e. 914 and Bah block has 950 tube wells. These tube wells are generated by electricity, diesel, and other means. In the district, there are only 283 Govt. tube wells.

5. TANKS AND RESERVOIRS:

There are 35 tanks around Jagner in tahsil Kheragarh covering an area of 11263 acres and a big reservoir Keetham in the Agra tahsil, covering an area 764 acres and holding 290 million cubic feet of water these tanks belong to irrigation department and are the only source of irrigation in this area, the water being released at the time of the Rabi sowing.

The Keetham reservoir in the tahsil of Agra was constructed with purpose of reclaiming the soil. It holds 290 million cubic feet of water and serves an area of 764 acres. In dry years, when the Yamuna fails to yield sufficient supplies of water for the waterworks of Agra city. Keetham is now the centre of recreation and pisciculture in the district. An area of about 200 acres land of horticulture in Singna is also irrigated by its water.

Fig. 2: Agra District: Drainage System



IRRIGATION IN AGRA

Irrigation is the artificial application of water to land for agriculture to prosper, it is important for the crops to get water at the right time. (5)

Agra has a monsoonal regime which provides water for our crops but there are many reasons why we cannot rely on the monsoon for water for our crops. Irrigation can solve this twin problem of flood and famine, the excess water from rivers can be stored in reservoirs and diverted by canal to drier areas.

NEED FOR IRRIGATION IN AGRA

1. Agra is an agricultural district and need water at the right time for the proper growth of its crops.
2. Rainfall in Agra is seasonal and occurs mainly in summer. Water is needed for the cultivation of winter Rabi crops.
3. The distribution of rainfall in Agra is scanty hence irrigation is useful for the crops especially wheat, potato, oilseeds and course grains.
4. Irrigation is important for cultivation in semi-arid parts of the district such as Fatehpur Sikri, Achhnera and Akola blocks.
5. Dispite the great improvements which have been made in the past, the district is still deficient in irrigation and to a large extent the cultivations have to depend on rainfall.

SOURCE OF IRRIGATION

Tube wells, wells, Canal, Tanks, Jhils, Pokhar (Small lakes) and rivers are the source of irrigation in the district of Agra. According to Sankhyikiya Patrika 2015 the source of irrigation in Agra District are given in tables.

According to the Sankhydiya Patrika-2015, In the district of Agra 252585 hectare land is net irrigated and 279715 hactare land is gross irrigation. Out of which 229199 hectare land is irrigated by tubewells (Public and Private), 21875 hectare land is irrigated by canals and 1448 hectare by well.. 38 hectare land and 25 hectare land irrigation by Ponds and other source. Fatehpur Sikri and Achhnera blocks have maximum irrigated land 25696 and 23352 hectere whereas Bichpuri block has least irrigated land i.e. only 6858 hectare. (Table 2 & 3).

The source of all tables and Maps is Sankhykiya Patrika- 2015.

Fig. 3: Agra District: Main Source of Irrigation-2015

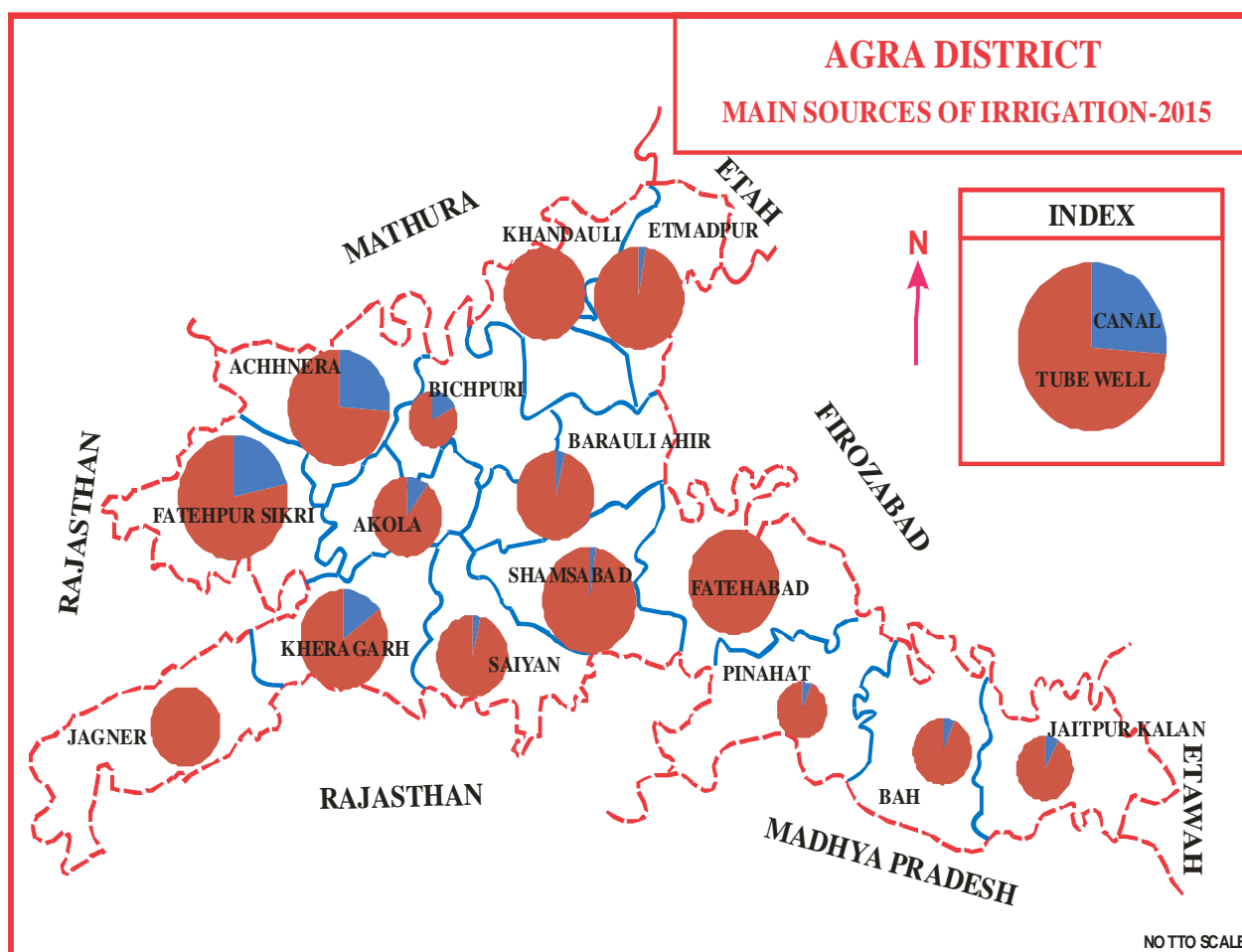


Fig. 4: Agra District: Irrigated Area in Different Crops-2015

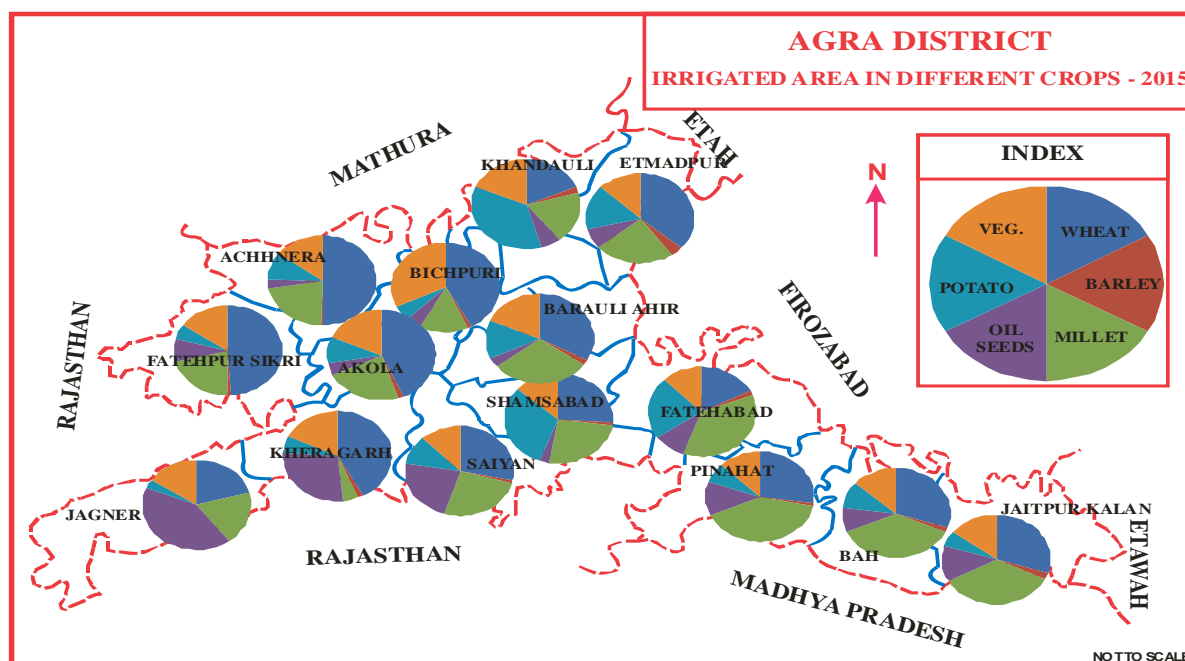


Table1: Agra District: Sources Of Irrigation - 2013-14

S.NO.	Source	Area In Hectare
1.	Tube well Public	4480
2.	Tube well Private	224719
3.	Canal	21875
4.	Ponds	38
5.	Wells	1448
6.	Others	25
TOTAL		252585

Table 2: Blockwise Total Area (Hect.) Irrigated By Different Sources In Agra District

S.No.	Block	Canal	Tubewell		Well	Ponds	Others	Total
			Public	Private				
1.	Fatehpur Sikri	5638	0	20055	0	2	1	25696
2.	Achhnera	6256	0	17092	0	3	1	23352
3.	Akola	1356	0	12108	244	2	2	13712
4.	Bichpuri	1271	0	5584	0	2	1	6858
5.	Barauli Ahir	666	0	16647	242	3	1	17559
6.	Khandauli	0	0	16653	238	4	4	16899
7.	Etmadpur	468	0	18308	254	3	1	19034
8.	Jagner	0	0	14899	0	3	3	14905
9.	Kheragarh	2577	13	14384	236	2	2	17214
10.	Saiyan	537	0	14592	0	2	1	15132
11.	Shamsabad	495	54	20450	234	2	2	21237
12.	Fatehabad	0	0	20493	0	2	1	20496
13.	Pinahat	551	1041	9699	0	2	1	11294
14.	Bah	932	1569	10751	0	2	2	13256
15.	Jaitpur Kalan	885	1744	9252	0	4	2	11887
Total Rural		21632	4421	220967	1448	38	25	248531
Total Urban		243	59	3752	0	0	0	4054
Total District		21875	4480	224719	1448	38	25	252585

Table 3: Agra District: Blockwise Total Area (Hect.) Irrigated In Different Crops- 2015

S.No.	Block	Wheat	Barley	Millet	Oil Seeds	Potato	Veg.
1.	Fatehpur Sikri	17003	243	7193	3714	1818	5516
2.	Achhnera	15329	207	6735	639	3249	4625
3.	Akola	8893	276	4731	698	2046	3905
4.	Bichpuri	4214	78	1547	238	663	3501
5.	Barauli Ahir	9784	553	8806	883	4153	5694
6.	Khandauli	4446	506	4728	1305	9199	4774
7.	Etmadpur	10107	893	6728	1911	4580	3741
8.	Jagner	4618	89	4715	11177	785	3759
9.	Kheragarh	9632	305	1031	6464	1455	4244
10.	Saiyan	8082	241	7229	6407	3078	3551
11.	Shamsabad	10802	275	10684	1041	12898	5804
12.	Fatehabad	6507	536	14132	3815	8670	5860
13.	Pinahat	6776	153	10207	3118	1814	3282
14.	Bah	7166	377	8910	2049	2485	3308
15.	Jaitpur Kalan	6656	449	7913	2529	1304	3281
Total		132110	5270	113927	47220	58804	67463

CONCLUSION

In Agra district wheat, millet, rice, oilseed, pulses and potato crops are produced. they all need much irrigation, In the district 132110 hectare land of wheat, 113927 hectare land of millet, 144853 hectare land of dhan, 146083 hectare land of total grains, 47220 hectare land of oil seeds, 67463 hectare land of vegetables and 58804 hectare land of potato is under irrigation. The tables reveal the blockwise irrigation land under different main crops of the study area.

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