

## Chapter - 23

# Irrigation and Drinking Water

The sources of water, which are useful for humans or which are likely to be used, are called water resources. Water is used in every area of life. Geographically, Rajasthan is the largest state in the country, but availability of surface water is only 1.16 % of India and tapping ground water only 1.72 %. Rajasthan is the state which receives the lowest rainfall in the country. There have been forty three famines in the state in the last sixty one years. It is extremely difficult to get drinking water in desert areas. Water resources are of utmost importance in Rajasthan. Water is life. The following lines in Rajasthani language tell this fact.

**“Ghee dhulaye to mahro kaeeni begare,  
Pani dhulaye to mahro jio jhal jaye,  
pani soo fashla pake, fal foola ro dher,  
pani Jad ruthe to dharti par andher”.**

(If butter is wasted, then nothing will deteriorate. If water is wasted, then our heart burns. The crops grow due to availability of water and we get stacks of fruits and flowers. When water is not available then there is darkness on this earth all around).

Most of the water resources in the state are limited to the south eastern part. Presently the annual availability of water per person in the state is 780 cubic meters, whereas it should be at least 1000 cubic meter. This availability is continuously decreasing. The country's 51 % fluoride and 42 %

salinity affected areas lie in Rajasthan.

Rajasthan's water resources can be divided into two parts.

1. Surface water resources and
2. Under ground water resources.

### Surface Water Resources

Rivers, lakes and ponds are the main sources of surface water. These sources are natural, but their water is widely used by digging canals. Chambal, Banas, Luni, Mahi, Banganga, Bedach, Gambhiri, Sukari, Kali Sindh, Parvan, Meja, etc are the main rivers of the state. The available water of these rivers is used either directly from these rivers or by taking off canals from dams erected on these rivers. The important plan of linking the rivers, to get rid of the problem of irrigation and drinking water is also proposed in the state. Rajasthan which enacted the law of linking rivers, has become the first state in the country. Lakes are also an important means of water supply in Rajasthan. The state has salt water and sweet water lakes, out of which sweet water lakes provide water for drinking water and irrigation.

The main fresh water lakes are Jaisamand, Pichola and Fatehsagar (Udaipur), Rajsamand (Rajsamand) Anasagar, Pushkar (Ajmer), Silised (Alwar), Kolayat (Bikaner), Nav Lakkha Lake (Bundi), Gop Sagar (Dungarpur), Kaylana, Balsamand (Jodhpur), Bandh Baretha (Bharatpur),

Ramgarh (Jaipur), Nakki lake (Mount Abu) Sirohi etc.

The pond is also a good source of surface water. There are about 450 big ponds in Rajasthan.

### Ground Water Resources

This resource has been the source of water harvesting for centuries. Presently 70% of the total irrigated area is irrigated with wells and tube wells in the state. Nearly 70 % drinking water sources in the state is also based on ground water.

### Water Conservation

Protection and rational use of resources so as to avoid loss of the resource and prevent wastage, this process is known as resource conservation. Participation of citizens, society, government in water conservation is absolutely essential. For water conservation, we should not throw industrial waste in the reservoirs. Do not wash clothes and not to take bath near water sources. Remove the weeds grown up in the water. Khadin, Kundi, Kui, Nadi, Johad, pond etc. are our conventional methods of water harvesting and storage. We will have to protect these means of conventional water sources. Rapid use of water has caused a big problem. Water can be saved by adopting the following methods of water conservation.

1. Adopting new methods of irrigation.
2. The rational use of ground water.
3. Control over vegetation destruction
4. Rain water harvesting.
5. Reuse of waste water after treatment.
6. Change in agricultural method and crop pattern.
7. Construction of small ponds, dams and anicuts etc.

The "Amritam Jalam" campaign of Rajasthan Patrika is an appreciable effort for water conservation.

### Irrigation

In the absence of rain, artificial supply of water to the land or crops is called irrigation. Irrigation is the part of the basic infrastructure for crop production. In Rajasthan, the largest area of land under irrigation out of the total irrigated area is in Shriganganagar and the lowest part is in Rajsamand district. In Rajasthan, wells, tubewells, canals, tanks etc. are the main sources of irrigation.

#### 1. Wells and tubewells

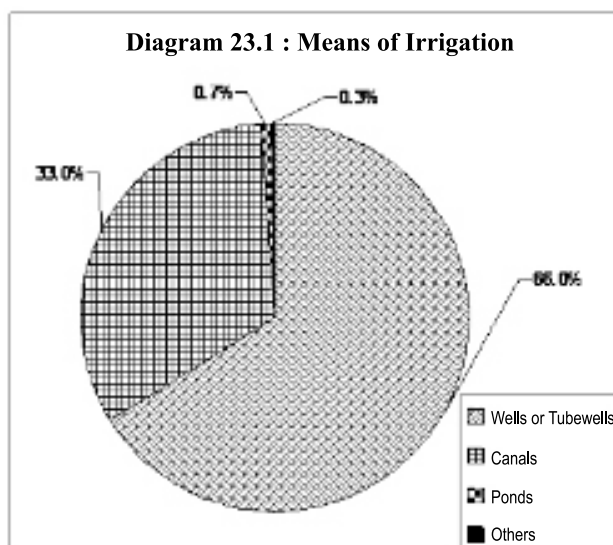
It is the main source of irrigation in the state. The 66 % area out of the total irrigated area of the state is irrigated by wells and tubewells. Most of the irrigation by this mode is done in Jaipur and Alwar. Due to the availability of fresh water in the Chandna tubewell in Jaisalmer district, this place is called "Ghara (Pitcher) of Thar"

#### 2. Canals

33% area of the state is irrigated by canals. Ganganagar district has the first place in canal irrigation.

#### 3. Ponds

0.7% part of the state is irrigated by this means of irrigation. This is the major source of irrigation in the southern and south-eastern parts of the state. In irrigation by the tanks Bhilwara district is on first place and Udaipur district is on second



place. Irrigation on just 0.3% area is done by other means.

### Major Multipurpose Projects of Rajasthan :

1. Chambal project
2. Bhakra-Nagal project
3. Vyas project
4. Mahi- Bajaj Sagar project.

### Large projects of Rajasthan -

1. Indira Gandhi Canal Project
2. Gang canal
3. Bharatpur canal
4. Gurgoan canal
5. Bhikha bhai Sagwara Mahi canal
6. Jakham project
7. Sidhmukh Nohar project
8. Bisalpur project (state's largest drinking water project)
9. Narmada canal project
10. Isarada project

### Other projects -

1. Jawai
2. Meja
3. Panchana
4. Mansi Vakal
5. Parwati
6. Gambhiri
7. Aurai

Here we will study, some of the state's major irrigation projects in detail :

#### 1. Indira Gandhi Canal Project

On completion of this project, it will be the largest project in the world. It is also called the life line of the state or Maruganga. Earlier, it was named as the Rajasthan canal. It was named Indira Gandhi Canal Project on 2nd November, 1984.

It is an important river valley project of the state. The objectives of this project are to provide

water for irrigation, drinking water, animal husbandry, fisheries and other uses in the western part of Rajasthan. The suggestion to construct it, was given in 1948 by Kanwar Sen the then irrigation engineer of Bikaner. The main objective of the construction of this canal was to use 86 lac acres cubic feet of water allotted to Rajasthan from the water of Ravi and Beas rivers. After the approval of the central government, the work of Harike Barrage was started in 1952 at the confluence of Sutlej and Beas rivers. The canal was made from Harike Barrage to Gadra Road in Barmer. To supply water to Sriganganagar, Hanumangarh, Bikaner, Jaisalmer, Barmer, Jodhpur, Churu and Nagaur districts.

From Harike Barrage to Hanumangarh's Masitaswali 204 km (169 Km in Punjab and Haryana + 35 km in Rajasthan) is a feeder canal. A part of a canal from where water is not used for any purpose, is called feeder canal. The length of the main canal with feeder is 649 km. The length of the distributaries are about 9060 km, which irrigates about 18.72 lakh hectare area. The end of the canal is currently up to the Gadra Road. From here, it is proposed to connect Kandla port in Gujrat, to make it navigable for small ships and boats.

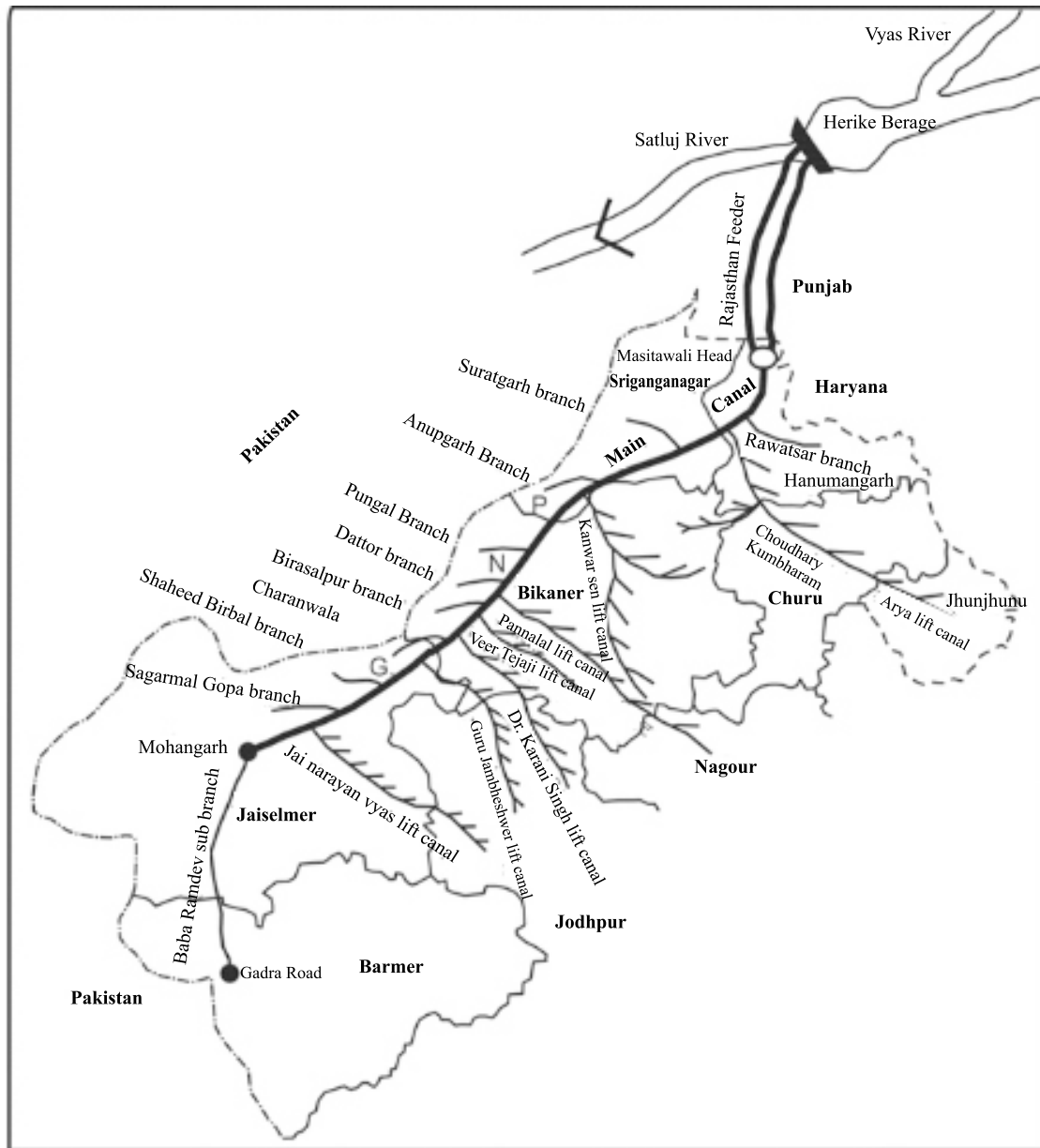
This project has been implemented in two phases -

**First Phase :** To connect 345 km long distributaries and to irrigate 5.53 lakh hectare area.

**Second Phase :** Constructing 256 km long main canal and 5112 km long distributaries and irrigation in 19.63 lakh hectare area.

In the Indira Gandhi Canal Project, 30 % total irrigation is done through lift canals and 70 % through distributaries.

Because the natural slope of the Thar desert is towards west, 8 lift canals have been built to bring water to the eastern parts. These are the following -



**Map 23.1 : Indira Gandhi Canal Project**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Gandheli (Nohar) Sahwa / Chaudhary Kumbharam lift canal.</li> <li>2. (Bikaner- Lunakaransar) Kanwarsan lift canal</li> <li>3. (Gazner) Pannala Barupal lift canal</li> <li>4. (Bangarsar) Veer Tejaji lift canal</li> <li>5. (Kolayat) Dr Karni Singh lift canal</li> <li>6. (Phalodi) Guru Jameswar lift canal</li> <li>7. (Pokran) Jai Narain Vyas lift canal</li> </ol> | <ol style="list-style-type: none"> <li>8. (Jodhpur) Rajiv Gandhi lift canal</li> </ol> <p>Main tributaries canals have been constructed from the Indira Gandhi Canal, which are as follows-</p> <ol style="list-style-type: none"> <li>1. Rawatsar branch (Hanumangarh)</li> <li>2. Suratgarh branch (Sriganganagar)</li> <li>3. Anupgarh Branch (Sriganganagar)</li> <li>4. Pungal Branch (Bikaner)</li> <li>5. Charanwala branch (Bikaner)</li> </ol> |
|--|---|



Fig. 23.1 : Indira Gandhi Canal in Western Rajasthan

6. Dattor branch (Bikaner)
7. Birasalpur branch (Bikaner)
8. Shaheed Birbal branch (Jaisalmer)
9. Sagarmal Gopa branch (Jaisalmer)

### Benefit

1. Direct benefit in the form of irrigation
2. Production of commercial crops
3. Growth of new towns and establishment of new business markets.
4. Development of fisheries and Animal husbandry
5. Benefit to the present wool business
6. 9.5 lakh tonnes of additional food grain production possible
7. Control on spread of the desert.
8. Development of pastures and Forest area
9. Development of barren land is possible.

Three small power houses have been established on Suratgarh and Anupgarh branches. With this project, 12.56 lakh hectare land is irrigated of Ganganagar, Bikaner, Jaisalmer districts and the facility of drinking water have been made available to about 1.80 crores people of eight districts of western Rajasthan. Water is also being available to

industries and production centers. The agricultural production has increased in this area due to the facility of irrigation by this project. Droughts have been stopped and human settlements are encouraged in the area. Along with power generation, animal husbandry, mineral industries and fisheries are also developed. The living standard of the people has also improved due to the increase in the income of the people.

## 2. Chambal Project

The Chambal project is a joint project of Rajasthan and Madhya Pradesh. Both the states have a participation of 50 % each. Chambal project was started in 1952-54. The primary objective of this project was to end the destructive activities of the River Chambal and to provide irrigation facility to 56 lakh hectares of land and to generate 230 megawatt electricity. Four dams have been built under this project-

### (1) Gandhi Sagar Dam

This dam was built in 1960 at Bhanpura tehsil of Madhya Pradesh. It has been built in a valley, 8 kms ahead of Chaurasigarh. Two canals are constructed from it -

- (i) **Left canal** : After reaching Bundi, it falls into the river Mej.

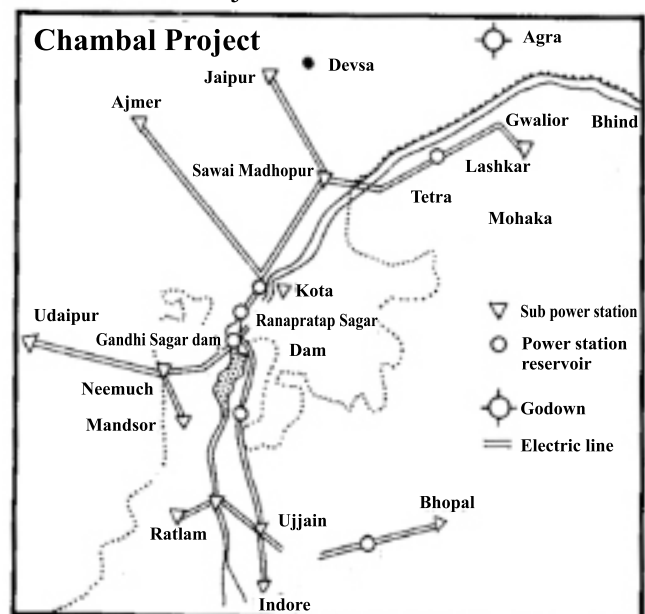




Fig. 23.2 : Chambal Dam project

(ii) **Right canal** : After crossing the river Parwati, it goes to Madhya Pradesh. There is also a hydel- power station here.

### (2) **Rana Pratap Sagar Dam**

This dam has been built, 48 kms ahead of Gandhi sagar in Chittorgarh, at a place called Rawatbhata, near Chuliya waterfall in the year 1970.

### (3) **Jawahar Sagar dam**

It has been built 38 kms. ahead of Rawatbhata at Boravas village near Kota. A hydel power station has also been built here.

### (4) **Kota Barrage**

It has been built near Kota. Having been built with the sole purpose of irrigation, this dam is called Barrage. Two canals have taken off from it. The right canal has gone to Madhya Pradesh after having crossed the rivers Parwati and Parwan. Whereas, the left canal irrigates and supplies water to the districts of Kota and Bundi in Rajasthan.

Due to the Chambal project, Kota has become a major industrial centre. In addition to flood control, irrigation facility has been provided to 5.6 lac hectares cultivable land. Agriculture has developed at a rapid pace in the area. Tourism has also been promoted in the Chambal area.

## 3. **Mahi Bajaj Sagar Project**

It is a joint project of Rajasthan and Gujarat for the development of tribal dominated districts of Banswara and Dungarpur of Southern Rajasthan. According to the agreement of 1966, Rajasthan has a share of 45 % and Gujarat has a share of 55 %. Under this project, the Mahi Bajaj Sagar dam has been built at Borkhera village in Banswara. Besides this, two canals, two power houses, two small power-houses and Kagdi pick-up dam have also been built. The work on this project was completed in three phases.

**First stage** - In the first stage, Mahi Bajaj Sagar dam was built on the river Mahi at Borkhera village near Banswara. The water storage area of this dam is 6240 sq km. The storage capacity of this dam is 72.70 T.M.C.

**Second stage** - Two canals namely Anandpuri and Sagwara, have been built to facilitate irrigation in Dungarpur. The total length of these distributaries is 854 Kms. By this project, availability irrigation facility has been proposed in an area of 1.23 lac hectares.

**Third stage** - Two power stations have been built in this stage, by which 140.95 megawatt electricity is being generated.



Fig. 23.3 : Mahi Bajaj Sagar Dam

The economic and social life of this tribal dominated area along with the agricultural and

industrial area has undergone a change due to the facility of irrigation and electricity. This project has proved to be a boon for this tribal dominant area.

Suggestions for Development of irrigation in Rajasthan-

1. Maximum conservation of the available water is essential.
2. Ground water should be used cautiously.
3. Intensive planning regarding water on the river basin basis should be done.
4. Modern technological methods should be used to reduce water loss due to evaporation and leakage of water.
5. Water should be saved by adopting drip irrigation technique.
6. Both ground water and surface water, should be used.
7. Water routes and the drains of fields should be lined on priority basis.
8. Due attention should be given on running projects so that they may give fruitful results.
9. New plans should be accepted on selected basis.
10. Supreme priority should be given on the maintenance of the project.

### **Drinking Water**

Rajasthan has inherited a limited and minimum water-source due to its geographical location and climatic conditions. The drinking water-supply is a gigantic task in the state. The conditions of drought and famine make it more difficult. The inadequacy of rains during monsoons and the climatic diversity of the state has made Rajasthan, the most dry state of India. The available water - sources in the state is only 1 % of the total sources of India. Quality of drinking water is below the standard due to presence or excessive soluble salts in the ground water at many places. The presence of flouride and salinity in ground water is a

major problem.

Due to water crisis, many a times, disputes and community struggles crop up on the use of common water-sources. The struggle for water is increasing due to the unhealthy methods of agricultural production and the over use of the effective traditional rain-water harvesting system.

Poor in terms of water, the state of Rajasthan, now needs restoration and upgradation of the traditional and ancient water-conservation techniques. Looking at the water-crisis, there is a dire need of using ancient water-conservation techniques. The Centre for Science and Environment (C.S.E) and the Thar Social Development Society, etc. are involved in rejuvenating the traditional water-conversvation techniques of Rajasthan. Attempt is being made to implement the old methods by using the impact of traditional and modern science.

The supply of drinking water is an important public welfare programme of the state. Earlier in Rajasthan, the females had to walk many km. With a pot on her head, to fetch drinking water but now a days due to the several public welfare schemes of the government, Rajasthan has become the leading state in terms of providing safe drinking water.

Arrangements are being made to ensure the supply of drinking water due to changes in the quality of ground water, reduction in the flow of ground-water, the falling water level, urbanization and the growing population under the plans.

The 'Janta Jal Yojna' is a drinking water scheme of the public health engineering department. It is prepared by the department and then it is handed over to voluntary organizations, N.G.O's and gram Panchayats for implementation. Presently excluding Bikaner and Jaisalmer districts of Rajasthan, 6514 'Janta Jal Yojna' are being run in the remaining 31 districts.

Very soon, a 'Jal Gram' will be made in all the districts of the country. The drinking water supply

will be ensured by the related departments in the village, selected for this purpose. People will be made aware regarding water-conservation. For supply of drinking water in rural areas, subsidy is given under the National Rural Water Mission by the central government. Handpumps are being repaired to provide safe drinking water to the rural people. With the co-operation of the German Govt. 'Apni Yojna' has been started from the Gandheli Sahawa lift canal to supply safe drinking water to villages of Hanumangarh, Churu and Jhunjhunu.

It is the result of the efforts done by the Public Health Engineering Department of Rajasthan, that safe and clean drinking water is being available to common man in the desert areas. This department connects the villages for drinking water facility to the regional water supply schemes, handpump, pumps, panghat yojna and tank schemes and Diggi schemes.

### **Rural Drinking Water Schemes**

There are total 43264 inhabited villages and 77869 'Dhanis' in the state. Out of these 42843 villages and 66560 'Dhanis' have been benefitted partially or completely by the year 2014-15 by means of various projects.

### **Urban Drinking Water Schemes**

All the 222 cities / towns of the state are getting water from various drinking water schemes. Out of these, approximately 20 % of the cities are getting the drinking water from the surface water sources and 60 % cities / towns are getting supply of drinking water from underground sources. The drinking water schemes remaining 20 % cities are based on combination of surface and ground-water sources.

Major drinking water schemes, which are to be started, are as follows:-

1. Barmer Lift Schemes
2. Isarada Dam
3. Jaipur-Bisalpur Phase second

4. Chambal-Bisalpur link scheme
5. Scheme for providing water to Alwar from Chambal.
6. Rural water supply scheme, Bhaisroadgarh, Chittorgarh.

### **Other Efforts for Irrigation, Drinking Water and Water Management**

1. Rajasthan Water Resource Regulatory Authority, 2013.
2. Rajasthan Water Area Re-construction Project (aided by the world bank)
3. Rajasthan Small Irrigation Improving project (RAJAMIIP) 2005.
4. Rain Water Harvesting Scheme, 2004
5. European Union State Co-operation Programme, 2007
6. Jalmani programme- providing clean and bacteria-free drinking water to the school children by installing water purification plants
7. Rajeev Gandhi Water Development and Conservation Mission, 2010
8. Irrigation Management and Training Institute, Kota, 1984
9. Rajasthan State Water Development Corporation Limited
10. 'Swajal Dhara Yojna', 2002.
11. Accelerated Irrigation Benefit Programme
12. Rajasthan Fluorosis Control Programme
13. Indira Gandhi lift canal project.
14. Mukhya Mantri Jal Swawlamban Abhiyan.

### **Mukhya Mantri Jal Swawlamban Abhiyaan -**

The main aim of this campaign is to make the villages self-reliant in water, so that problems of non-availability of water for domestic use and livestock during water crisis and droughts may be resolved. It was being made as a public campaign instead of only a government programme. The



participation of nine government department, social groups, religious trusts and public has been ensured in this campaign. In addition to the state efforts, resources in the form of machines & material have been arranged by contribution by Bhamashah, C.S.R activities, N.G.O's, Voluntary Shramdaan and community cooperation. Under this campaign, 91043 water conservation and storage works are done in 3529 villages of the state till mid-July, 2016. Under this campaign, geotagging of all the proposed works has been done after studying the proposed detailed project reports, so that physical conditions, authenticity, quality and stability of the water conservation and storage structures constructed under the campaign may be ensured. Under the campaign, Staggered Trench, Sustained Contour Trench, Mini Percolation Tank, Naadi digging, Khadeen construction, Talai construction, reformed structures for roof water storage, Recharge kit on dry handpumps, Farm ponds, etc water conservation and storage works have been done on large scale. By it, the water-level will rise, soil erosion will stop, in the coming years Rajasthan will be entirely free from water crisis after the completion of water conservation in all the regions.

### IMPORTANT POINTS

1. Rajasthan is the largest state in India in terms of geographical area.
2. Rivers, lakes and ponds are the major sources of surface water.
3. Rajasthan is the first state in the country to make a law for linking the rivers.
4. Presently, 70 % of the total irrigated area in the state is irrigated by wells and tubewells.
5. Protection and rational use of resources so as to avoid loss of the resource and prevent wastage is known as resource conservation.
6. Khadeen, Kundi, kui, Naadi, Johad, Ponds, etc. are the traditional methods of water conservation and storage in the state.

7. The process to supply water in land in an artificial way, in absence of rain is called Irrigation.
8. On completion, the Indira Gandhi canal project will be the largest project in the world. It is called "life line / Maruganga of the state.
9. Chambal project is a joint project of Rajasthan and Madhya Pradesh. The two states have a participation of 50 - 50.
10. It is a joint project of Rajasthan and Gujarat for the prosperity of the people of the tribal dominated district of Banswara and Dungarpur in Southern Rajasthan.
11. Supply of drinking water in the state is a difficult task. Drought and famine conditions make it even more difficult.
12. The arrangement of drinking water is an important programme of the state's plan.
13. Janta Jal Yojna is a drinking water scheme of the public health Engineering department.
14. Subsidy is given by the govt. of India under the National Rural Drinking Water Mission for the works of drinking water schemes in the rural areas.
15. The major objective of the Mukhya Mantri Jal Swawlamban Abhiyan is to make the villages self-reliant in their water requirement.

### EXERCISE

#### Multiple Choice Type Questions

1. The main district in terms of irrigation by wells and tubewells is-  
 (a) Jaipur                      (b) Bharatpur  
 (c) Alwar                        (d) Dholpur
2. In which part of the state, more than 26 % irrigation is done by wells?  
 (a) North and North Eastern  
 (b) South and South East

- (c) South and South West  
(d) Eastern
3. Which two lakes of Rajasthan are more useful in terms of irrigation?  
(a) Jaisamand, Rajsamand  
(b) Fatehsagar, Udaisagar  
(c) Ummedsagar, Bhopalsagar  
(d) Hemavas, Sardarmand.
4. What percentage of the water resources of India are in Rajasthan?  
(a) 5 %                      (b) 8 %  
(c) 1 %                      (d) Negligible
5. Ganganagar has been linked to the Indira canal at -  
(a) Near Sadhuwali    (b) Near Pong Dam  
(c) Near Lohagarh    (d) Near Gajner
6. What is called the Ghara (Pitcher) of Thar?  
(a) Chandan Tubewell  
(b) Mandal Tubewell  
(c) Saline Water Tubewell  
(d) Fresh Water Tubewell
7. Indira Gandhi canal enters in Rajasthan at -  
(a) Masitawali head    (b) Sitawali head  
(c) Kharsan head        (d) Bikaner head
8. Jawahar Sagar dam is on -  
(a) Morvan River        (b) Mahi River  
(c) Chambal River       (d) Banas River

#### Very Short Answer Type Questions

9. Which is the largest state of the country in terms of geographical area?
10. Name the main lakes of Udaipur.
11. Where is Nakki Lake situated?
12. Which is the main source of irrigation in Rajasthan?

13. Name the water conservation campaign run by Rajasthan Patrika.
14. What is the percentage area irrigated by the distributaries of Indira Gandhi canal project?
15. Name the dams coming under the Chambal project?
16. What is the share of different states in Mahi Bajaj Sagar project?
17. Tell the two main problems of ground water in Rajasthan?
18. Which department runs the Janta Jal Yojna?
19. At which level the water grams will be made in country.?
20. With which country's collaboration Aapni Yojna is running?

#### Short Answer Type Questions

21. Name the major rivers of Rajasthan.
22. Name the traditional methods of water harvesting and storage in our state.
23. Name the main branches of the Indira Gandhi canal.
24. Give suggestions for the development of irrigation in Rajasthan.
25. Name the projects started recently?
26. Throw light on Mukhya Mantri Jal Swawlamban Abhiyaan.

#### Essay Type Questions

27. Describe the Indira Gandhi Canal project.
28. Describe the Chambal Irrigation Project.
29. Throw light on the efforts for drinking water development in Rajasthan.

#### Map/Skill Based Questions

30. Show the major Irrigation Projects of Rajasthan on a map.
31. Show the main branches of Indira Gandhi Canal on a map of Rajasthan.