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Modernisation of Agriculture Pattern in Gang Canal Command Area: A Case Study of Sri Ganganagar District, Rajasthan

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ABSTRACT: The Ganga Canal of Rajasthan^[1] (also called Gang Canal) is an irrigation system of canals laid down by Maharaja Ganga Singh in the present district of Sri Ganganagar in the early twentieth century. It is fed from the Sutlej River near Ferozpur, Punjab, close to the India–Pakistan border, and passes through the Faridkot and Muksar districts. Faridkot's Jhok Sarkari village lies on its path.

KEYWORDS: gang-canal, Sri Ganganagar, agriculture, modernisation, case, study, Rajasthan

I. INTRODUCTION

The Bikaner state was one of the areas most affected by the Indian famine of 1899–1900. In order to get rid of this problem permanently[1,2], in 1903 East India Company obtained the services of A.W.E. Standley, chief engineer, who demonstrated the feasibility of the western area of the Bikaner State being brought under irrigation from the Satluj Waters. The plan of the Satluj Valley Project was drawn by then chief engineer of Punjab Mr. R. G. Kennedy, according to which the vast area of erstwhile Bikaner state could be brought under irrigation. Because of objections by the erstwhile Muslim State of Bahawalpur, the project got delayed and finally with intervention of then viceroy of India, Lord Curzon, in 1906, a tripartite conference was held and an agreement was signed on 4 September 1920. The foundation stone of the Canal Head Works at Ferozepur was laid on 5 December 1925 and the work completed in 1927 by constructing 89 miles of lined canal.[3,4] The opening ceremony was performed on 26 October 1927 by Lord Irwin, the then viceroy of India. Irrigated parts of then Bikaner State now came under the Sri Ganganagar district and Hanumangarh district. The canal irrigates 303,000 hectares of land, roughly equivalent to that of the Upper Bari Doab Canal.^[1]



The cost of whole project was Rupees 310.97 Lakhs upto 1943. Another 60 Lakhs were spent on development of Gang Colony and railways.^[2] After construction of the canal, many people from south Punjab migrated to this area, the state administration facilitated several facilities for them. With availability of water from canal, this area transformed into rich land and Ganganagar became the granary of Rajasthan.^[3]



During the Partition of India, Sir Cyril Radcliffe, the chairman of the Punjab Boundary Commission, initially considered awarding the Ferozpur and Zira tehsils of the Ferozpur District to Pakistan. [5,6] This would have put the headwaters of the Ganga Canal in the territory of Pakistan. Bikaner's prime minister K. M. Panikkar warned the Viceroy Lord Mountbatten that the Bikaner state would have no choice but to accede to Pakistan in the event of the headwaters going to Pakistan. Jawaharlal Nehru also wrote to the Viceroy stating that it would be "most dangerous" for the Ferozpur district to go to Pakistan for "strategic and irrigation reasons". Subsequently, Radcliffe removed the salient and awarded the entire Ferozpur district to India.^[4]

In Rajasthan, The Krishi Vigyan Kendra, Dholpur is mandated to technology assessment and demonstration for its application and capacity development. The KVK organizes different activities like -On-farm testing to assess the location specificity of agricultural technologies under various farming systems, Organize Frontline Demonstrations to establish production potential of technologies on the farmers' fields, Capacity development of farmers and extension personnel to update their knowledge and skills on modern agricultural technologies, Work as knowledge and resource centre of agricultural technologies for supporting initiatives of public, private and voluntary sector in improving the agricultural economy of the district and Provide farm advisories using ICT and other media means on varied subjects of interest of farmers. KVK works on the principle "Learning by doing and teaching by doing".

During last eight years (2011-12 to 2018-19) KVK Dholpur have constructed 500 NADEP pits at 500 farmers of 25 villages under Krishi Kalyan Abhiyan. More than 500 farmers have started using of waste decomposition. On Farm Testing at 343 farmer's field in 43 ha area for assessment of technologies of crops wheat, mustard, chickpea, potato, okra and brinjal has been conducted. Front Line Demonstrations (1643) were also organized at partner farmers field to show the production potentiality of promising technologies. Capacity of 15590 partner farmers and farm women have been developed through training programmes in diverse areas of agriculture. Vocational training programmes for rural youth on nursery management, apiculture and dairy management were organized. Extension programmes (2275) kisan gosthi, field day, farmers fair, agriculture exhibition, farmer scientist interaction, night gosthi, awareness programmes, and benefitted 85259 participants. With the help of 4009 mobile advisories and 320 Scientist visits benefitted 4676 farmers and farm women.

The Krishi Vigyan Kendra, Dholpur is an innovative first line science based transfer of technology institution. KVK coordinating the programme of Government of India 'Transformation of Aspirational Districts', programme aims to quickly and effectively transform district Dholpur. The flagship programmes like National Food Security Mission, Integrated Farming System Models, Skill Development, Mera Gaon Mera Gaurav, etc. are the major initiatives in doubling the farmers' income. KVK having different demonstration units of vermicompost, azola, backyard poultry, herbal garden, micro irrigation, nursery green shed, waste decomposer, NADEP pit, mushroom production, ber and aonla orchard, seed production which plays critical role in transferring practical knowledge among the farming community.

II. DISCUSSION

Gang Canal Major Irrigation Project JI01487

#	Attribute	Value
1	Irrigation Project Name	Gang Canal Major Irrigation Project
2	Irrigation Project Name Alias	
3	Purpose	Irrigation
4	Type	Major
5	Engineering Type	Diversion
6	Status	Completed

#	Attribute	Value
7	State	Rajasthan
8	Districts Benefited	Ganganagar,Hanumangarh
9	Basin	Indus up to International Border
10	River	Sutlej
11	Project Sharing	None
12	Intercountry	None
13	Interbasin	No
14	Work Started in 5 Year Plan	Pre-Plan
15	Completed in 5 Year Plan	Pre-Plan
16	Project Approval Status	
17	Year of Approval by Planning Commission	
18	Approved Cost (Rs. in cr)	
19	Actual Cost (Rs. in cr)	3.32
20	Culturable Command Area (CCA) (th ha)	307.97
21	Ultimate Irrigation Potential (UIP) (th ha)	184.54
22	Potential Created (PC) (th ha)	184.54
23	Project Covered under ERM Scheme	Yes
24	Project Covered under CADA Scheme	Yes
25	Project Covered under AIBP Scheme	No
26	Studies Conducted	
27	Project Covered under Tribal Sub-Plan	No
28	Project Covered under Drought Prone Area Programme (DPAP)	
29	Remarks	
#	Name	Type
1	Ferozepur Barrage	Barrage/ Weir/ Anicut (BWA)
2	Harike Barrage	Barrage/ Weir/ Anicut (BWA)

Description of project in Brief

Gang Canal project is operational since 1927 and supplies to Gang Canal System were earned by Bikaner Canal taking off from Hussainiwala headworks at Ferozepur on River Sutlej till 1947 and thereafter, Bikaner Canal, receives its supplies through Ferozepur Feeder taking off from Hanke headworks at its RD 45000. Bikaner Canal from its RD 45000 to RD 368500 (112 KJvf) is m' Punjab portion and the canal enters Bikaner Territory at RD 368500 where the

first irrigation channel takes off. It was utilizing 1.11 MAF of water before partition and Rajasthan was getting 2720 cusecs of water. The project had a CCA of 307.568 th. ha. Annual irrigation is 184.54 th. ha. [7,8]

Modernisation of Canal system

Gang Canal project is operational since 1927. It was utilizing 1.11 MAF of water before partition and Rajasthan was getting 2720 cusecs of water. Its capacity is reduced to about 2000 cusecs due to highly dilapidated condition of lining and needed modernization.

Modernization Project was approved for Rs. 445.79 crore (1998 price level) by Planning Commission during the year 2000. The latest estimate cost of the project (at 2008 price level) is Rs. 621.42 crores (under AIBP) which is approved in 106th T.A.C. meeting held on 16-09-2010. The project was started during the year 1982-83 & is likely to be completed by 2013-14. Rajasthan State also made an additional allocation of 0.33 MAF to Gang Canal from its own share of surplus Ravi-Beas water. Due additional allocation out of surplus water, at present 1.44 MAF water is being utilized for Gang Canal System through Bikaner Canal. A 76.20 Km. long Gang Canal Link Channel connecting Indira Gandhi Nahar Feeder to Gang Canal with head discharge of 3230 cusecs (91.41 cumecs) is a part of this project. Due to saving of water after Modernization and additional allocation of water, CCA of Project was increased from 307.567 th. ha. to 355.760 th. ha. Intensity of Irrigation was increased from 60% to 79%. Additional annual irrigation envisaged after Modernization is 96.510 th. ha in Sriganganagar District of Rajasthan. The project is getting funds under AIBP and upto March 2011 potential of 91,721 ha is created against 96,510 ha. The project is nearing completion. [9]

III. RESULTS

The Ganges Canal or Ganga Canal is a canal system that irrigates the Doab region between the Ganges River and the Yamuna River in India.

The canal is primarily an irrigation canal, although parts of it were also used for navigation, primarily for its construction materials. Separate navigation channels with lock gates were provided on this system for boats to negotiate falls. Originally constructed from 1842 to 1854, for an original head discharge of 6000 ft³/s, the Upper Ganges Canal has since been enlarged gradually for the present head discharge of 10,500 ft³/s (295 m³/s). The system consists of main canal of 272 miles and about 4000 miles long distribution channels. The canal system irrigates nearly 9,000 km² of fertile agricultural land in ten districts of Uttar Pradesh and Uttarakhand. Today the canal is the source of agricultural prosperity in much of these states, and the irrigation departments of these states actively maintain the canal against a fee system charged from users. [10]

There are some small hydroelectric plants on the canal capable of generating about 33MW if running at full capacity these are at Nirgajini, Chitaura, Salawa, Bhola, Jani, Jauli and Dasna. [1][2]

Structure

The canal is administratively divided into the Upper Ganges Canal from Haridwar to Aligarh, with some branches, and the Lower Ganges Canal which constitutes several branches below Aligarh.

Upper Ganga Canal

The Upper Ganges canal is the important and the original Ganges Canal, which starts at the Bhimgoda Barrage near Har ki Pauri at Haridwar, traverses Roorkee, Purquazi, Sardhana (Meerut district), Muradnagar, Dasna, Bulandshahr, Khurja, Harduaganj and continues to Nanau (near Akraabad) in Aligarh district, where it bifurcates into the Kanpur branch and Etawah branch.

Lower Ganga Canal

A channel from Chaudhary Charan Singh Ganga barrage at Narora (Bulandshahr district) intersects the canal system 48 km downstream from Nanau (Aligarh district), and continues past the Sengar River and Sersa River, past Shikohabad in Firozabad District to become the Bhognipur branch which was opened in 1880. This branch, starting at village Jera in Mainpuri district, runs for 166 km to reach Kanpur. At kilometre 64 the Balrai escape carries excess water through a 6.4 km. channel through the ravines to discharge into the Yamuna. This branch has 386 km. of distributary channels.

The Bhognipur branch, together with the Kanpur and Etawah branches, is known as the Lower Ganges Canal. The old channels of the old Kanpur and Etawah branches between Nanau and the point of intersection by the channel from Narora, are known as "stumps", and are utilized only when the supply of water in the lower Ganges system runs low.^[3] The main branch of the river passes Kanpur (behind IIT Kanpur campus) before breaking into several branches. A branch of it terminates Kanpur Jal Sansthan which comes from behind J. K. Temple.

History

The canal was the brainchild of Sir Proby Cautley; construction began in 1840, and the canal was opened by Governor-General Lord Dalhousie in April 1854.

An irrigation system was felt necessary after the disastrous Agra famine of 1837–38, in which nearly 800,000 people died, and nearly ten million rupees was spent on relief works, resulting in considerable loss of revenue to the British East India Company. One of the moving forces behind the canal was Colonel Proby Cautley, who was confident that a 500-kilometre canal was feasible. There were many obstacles and objections to his project, mostly financial, but Cautley persevered and after spending six months walking and riding through the area taking measurements, he managed to persuade the British East India Company to sponsor the project.

Digging of the canal began in April 1842.^[4] Cautley had to make his own bricks, brick kiln and mortar. Initially, he was opposed by the Hindu priests at Haridwar, who felt that the waters of the holy river Ganges would be imprisoned but Cautley pacified them by agreeing to leave a gap in the dam from where the water could flow unchecked. He further appeased the priests by undertaking the repair of bathing ghats along the river. He also inaugurated the dam by the worship of Lord Ganesh, the god of good beginnings. The dam was faced with many complications- among them was the problem of the mountainous streams that threatened the canal. Near Roorkee, the land fell away sharply and Cautley had to build an aqueduct to carry the canal for half a kilometre. As a result, at Roorkee the canal is 25 metres higher than the original river. When the canal formally opened on 8 April 1854,^[4] its main channel was 348 miles (560 km) long, its branches 306 miles (492 km) long and the various tributaries over 3,000 miles (4,800 km) long. After irrigation was commenced in May 1855,^[4] over 767,000 acres (3,100 km²) in 5,000 villages were irrigated.[11]

In 1877 the whole canal system of the lower Doabs underwent radical alteration. The Lower Ganges Canal, with a feed from a channel from Narora, was constructed into the ghar tract of Etawah, and became the Bhognipur branch. Around 1900, according to the Nuttall Encyclopedia of 1907, it had a total extent of 3,700 miles (6,000 km), of which 500 miles (800 km) were navigable. Building of this canal also eventually led to the establishment of first engineering college in India,^[5] the College of Civil Engineering at Roorkee (Now Indian Institute of Technology, Roorkee).^[6]

IV. CONCLUSION

The Indira Gandhi Canal (originally, Rajasthan Canal) is the longest canal in India. It starts at the Harike Barrage near Harike, a few kilometers downriver from the confluence of the Satluj and Beas rivers in Punjab state, and ends in irrigation facilities in the Thar Desert in the northwest of Rajasthan state. Previously known as the Rajasthan Canal, it was renamed the Indira Gandhi Canal on 2 November 1984 following the assassination of Prime Minister Indira Gandhi.



The canal consists of the Rajasthan feeder canal with the first 167 kilometres (104 mi) in Punjab and Haryana state and a further 37 kilometres (23 mi) in Rajasthan. This is followed by the 445 kilometres (277 mi) of the Rajasthan main canal, which is entirely within Rajasthan. The canal enters Haryana from Punjab near Lohgarh and runs through the

western part of the Sirsa district before entering Rajasthan near Kharakhera village in the Tibbi tehsil of the Hanumangarh district.

It traverses seven districts of Rajasthan: Barmer, Bikaner, Hanumangarh, Jaisalmer, Jodhpur, and Sriganganagar. The main canal is 445 km (277 mi) long, which is 1458 RD (reduced distance). From 1458 RD, a 96 km (60 mi) long branch starts, known as the Sagar Mal Gopa Branch or the SMGS. From the end point of SMGS, another 92-kilometer-long sub-branch starts, the last of the Baba Ramdev sub-branch. It ends near Gunjanganarh village in Jaisalmer district.

The idea of bringing the waters from the Himalayan Rivers flowing through Punjab and into Pakistan was conceived by hydraulic engineer Kanwar Sain in the late 1940s. Sain estimated that 2,000,000 ha (20,000 km²) of desert land in Bikaner and the northwest corner of Jaisalmer could be irrigated by the stored waters of Punjab rivers. In 1960, the Indus Water Treaty was signed between India and Pakistan, which gave India the right to use the water from three rivers: the Satluj, Beas and Ravi. The proposed Rajasthan Canal envisioned use of 7,600,000 acre-feet (9.4×10⁹ m³) of water.^[1]

The initial plan was to build the canal in two stages. Stage I consisted of a 204 km (127 mi) feeder canal from Harike barrage, Firozpur, Punjab to Masitawali (Hanumangarh) with the main canal of 189 km (117 mi) from Masitawali (Hanumangarh) to Pugal, (Bikaner) in Rajasthan. Stage I also included constructing a distributary canal system of about 2,950 km (1,830 mi) in length. Stage II involved constructing a 256 km (159 mi) long main canal from Pugal (Bikaner) to Mohanganarh (Jaisalmer) along with a distributary canal network of 3,600 km (2,200 mi). The main canal was planned to be 140 ft (43 m) wide at the top and 116 ft (35 m) wide at the bottom with a water depth of 21 ft (6.4 m). It was scheduled to be completed by 1971.



The canal faced severe financial constraints, neglect and corruption.^[2] In 1970 the plan was revised and it was decided that the entire canal would be lined with concrete tiles. Five more lift schemes were added and the flow command of Stage II was increased by 100,000 ha (1,000 km²). With increased requirements, the total length of main, feeder and



distribution canals was about 9,245 km (5,745 mi). Stage I was completed in 1983 around 20 years behind the completion schedule.

After the construction of the Indira Gandhi Canal, irrigation facilities were available over an area of 6,770 km² (1,670,000 acres) in Jaisalmer district and 37 km² (9,100 acres) in Barmer district. Irrigation had already been provided in an area of 3,670 km² (910,000 acres) in Jaisalmer district. Mustard, cotton, and wheat now grow in this semi-arid northwestern region, replacing the soil there previously. However, many dispute the success of this canal in arid regions and question whether it has achieved its goals.[11]

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