



# Appraisal of Kelia Irrigation Systems : A Boon for Tribal Part in South Gujarat Region

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## Abstract

For the development and promotion of irrigated agriculture in Navsari District (originally Valsad District) located in the Southern part of Gujarat State, Kelia Reservoir Project was taken up by the Government of Gujarat. Kelia Project was estimated to cost Rs. 616.60 Lacs as per the W. B. Appraisal Summary Report of August 1980. Later on the Project cost estimate was revised to Rs. 971.00 Lacs. The Original CCA under Kelia Left Bank Branch Canal was 1,273 Ha. Moreover, Right Bank Branch Canal was 937 Ha thus making the total CCA of the project as 2,210 Ha. Fertile land, good rainfall, sufficient storage, improving marketing facilities, development of agro-industries and progressive nature of farming community in the command area have provided the necessary circumstances for accelerating the pace of agriculture development. On the other hand in recent past, conveyance capacities found to be inadequate for canals to meet present and future irrigation demands. It is due to increased irrigation intensity with growing cash crops such as sugarcane; inadequate drainage provisions leave the consequent effects on modifications in cropping pattern and constraints in ensuring efficient water management have imposed severe limitations on the planned development of the area. Recently, the Government of Gujarat has attempted to review the existing cropping pattern and identify the actual water requirement of crops in irrigation projects of Gujarat. This paper provides details on the cropping pattern and theoretical demand of net irrigation requirement of water for various crops being cultivated in the existing scenario. In addition to above, a brief evaluation of the water carrying capacity of canals based on proposed cropping pattern and suggests modifications in canals system is also referred.

**Keywords:** Irrigation system, Kelia project, Reappraisal, Tribal area irrigation

## Introduction

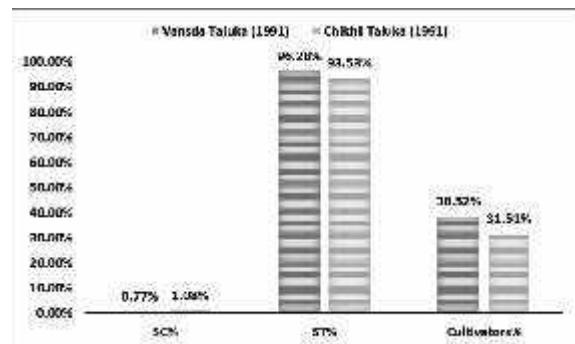
Kelia Reservoir was taken up by the Government of Gujarat during the 1980s. It is a dual-purpose medium type of irrigation scheme serving the tribal villages in the South Gujarat region for assisting in the agricultural activities along with flood control. The total service area (Culturable Command Area-CCA) under the scheme in its final stage of development as planned was to be 2,486 Hectares (Ha.) with a total irrigation intensity of 109%. Irrigation network for 2,210 Ha. has been completed. Originally the Kelia was designed solely to irrigate an area of 2,486 Ha. The entire Kelia Left Bank Branch Canal – LBMC and Right Bank Branch Canal – RBMC are lined with pre-cast cement blocks on both the sides and cast-in-situ in bed with polyethylene film below it. The scheme observed maximum irrigation in the year 1999 having irrigated 2,053 Ha.

The project envisaged construction across Kharera River (Latitude 20°42'-0" N and Longitude 73°16'-45" E) near Village Kelia of Taluka Vansda in the Navsari District (Earlier Valsad District).

The nearest railway station is Unai on Wagai-Bilimora

narrow gauge line is 24 Km. away. The Kelia project mainly serves two Taluka: Vansda and Chikhli. The beneficiaries belong to the villages of Kelia, Sukhbhari, Pipalkhed, Kansariya, Vaghbari and Vandarvela of Vansda along with Sarvani, Ambach, Kakadvela, Velanpur, Ghodvani, Dhamduma, Kambhai, Rumla, Agaasi, Dholumbar, Miyazari and Mandavkhadak villages of Chikhli taluka.

From the Census (**Figure 1**) from the year 1991, the



**Figure 1** SC-ST population and Agriculture activity involvement  
(Source: Census of India, 1991)



total population of villages of Vansda taluka was around 13,600 whereas that of Chikhli taluka was reported about 33,300. From above Figure, it can be visualized that the ST population in all these villages are more than 90% whereas the workforce under Cultivators, and Agricultural labors are larger than 30%. In general, in India the workforce participation is observed to be around 35% of total population. The Kelia Water resource project acted as a boon bringing in fortunate and prosperity among these tribal villages of Vansda and Chikhli Taluka.

The climate is subtropical monsoon type with a temperature suitable for year-round cropping. Daily minimum and maximum Temperature ranges from 14.8 °C to 37.3 °C with its peak during April. The Project area is predominantly under the influence of the South-West monsoon with 96% of the rainfall occurring from June to September with July as the wettest month. The annual rainfall of the project area ranges from less than 1200 mm to over 2500 mm with a yearly average of 1200.70 mm. Inadequate conveyance capacities of the canal found to be failed to meet present and future irrigation demands due to increased irrigation intensity with increasing coverage of cash crops (such as sugarcane and other perennial crops). Moreover, the inadequate drainage provisions and their consequent effects on cropping pattern, fewer control structures and restrictions in ensuring effective water management have forced severe limitations on the planned development of the area.

For the above reasons, in recent past, the Government of Gujarat attempted for a review of the existing cropping pattern and actual water requirement of crops in all the irrigation projects across the Gujarat state.

Sections from now on discuss on comparative details related to planned and existing situations for the aspects of the cropping patterns and general demand of net irrigation requirement of water for various crops being cultivated in the existing scenario. Also, a brief evaluation of the water carrying capacity of canals based on proposed cropping pattern with suggests modifications in canals and structures thereof are discussed.

### Kelia Dam Project & Systems

#### Dam

The section for the dam is revised as per revised floods hydrology that worked out to 1,225 Cusecs, increased from previous 912 Cusecs. The Earth dam is 723 Mt.



**Figure 2** Kelia dam

long. The top of the dam as per revised flood hydrology works out to 118.6 Mt. The top width is 6.00 Mt. The maximum height is 26.60 Mt. across the river Kharera from the river bed level (**Figure 2**).

#### Masonry Dam with Spillway

Chutes spillway is between Ch. 701.00 Mt. To 814.00 Mt. with left and a right key of 8.10 Mt. length on both the sides. The crest of Chutes spillway is at R. L.

**Table 1** Designed Kelia Irrigation System

Sr. No.	Details Of Canal	GCA (in Ha.)	CCA (in Ha.)	Annual irrigation Ha.
1	K.L.B.B.C.	3,173	1,312	1,830
2	K.R.B.B.C.	2,811	1,171	1,638
	<b>TOTAL</b>	<b>6,014</b>	<b>2,486</b>	<b>3,468</b>

(Source: Sub-division office, Kelia, 2011)

112.60 Mt. A Spillway basin and chutes blocks with dented end sill has been provided on the downstream at chute spillway for the dissipation of the energy. The F.R.L./H.F.L. is 112.60/115.10 Mt. It is a non-gated chutes spillway with 113.00 Mt. length.

#### Head Regulators

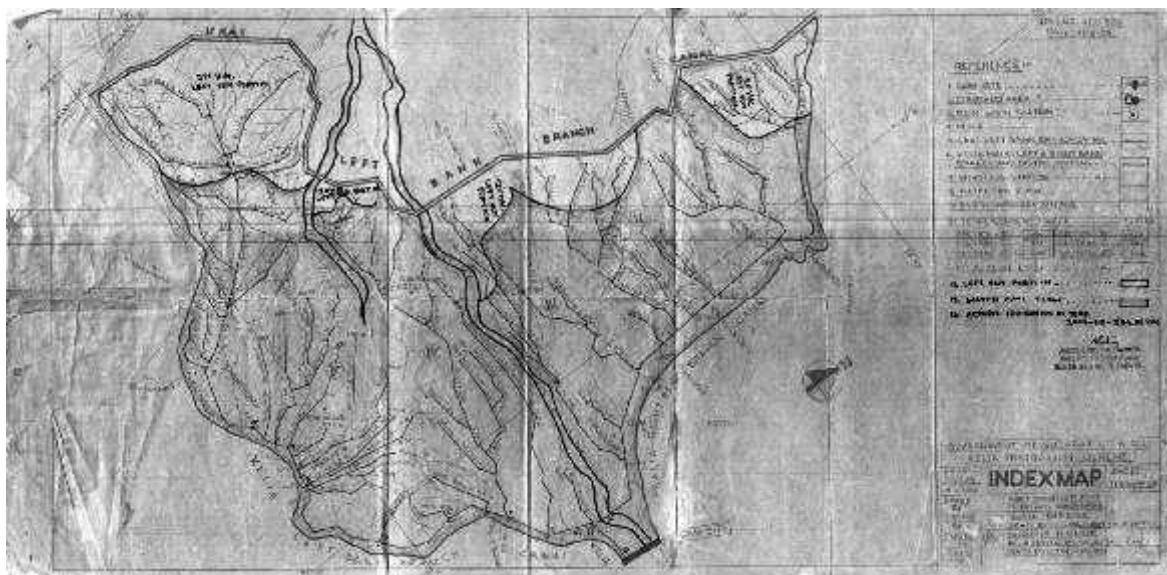
Only one Head Regulator at Ch. 75 Mt. with twin entry of size 1.20 Mt. × 1.50 Mt. is provided.

#### Canal and Distribution System

Only one Left Bank Canal has been offered in the first reach up to 810 Mt. and then after Right Bank Canal of 0.81 Km. long with a capacity of 2.07 Cumecs with Maximum Section as  $2.50 \times 1.50$  Mt. is off-taking. The distribution system including minors and sub-minors up to 8 Ha. block covers CCA of 2,480 Ha. on the either sides (**Table 1**). The entire canal system up to 8 Ha. block is lined with pre-cast blocks on both the sides and cast-in-situ in bed with polyethylene film below it.

The left Bank canal is of 8.7 Km. length. The main canal has 90 structures whereas distribution system has 960 structures. The right Bank main canal is 7.50 Km. long, having a capacity of 1.10 Cumecs with maximum section 2.50 Mt.  $\times$  1.50 Mt. Both the canal

with distribution networks is irrigating about 2,210 Ha. in the Navsari district. The Details of original GCA & CCA and anticipated annual irrigation for both canals are shown in **Figure 3**.



**Figure 3** Command area of Kelia Water Resource Project

(Source: Sub-division office, Kelia)

The Project was designed to serve the backward and underdeveloped region of the state i.e. Vansda, Chikhali Taluka of the Navsari district. The facilities of irrigation to this region are proving to be a boon to farmers, who were at life at the mercy of the weather. Construction of Kelia Project in this region has obviously made a significant impact on the social-economic life of the agriculture community.

#### *Soil and Topography*

The soil in the command area have residual origin derived from the Volcanic Deccan trap rock and accrue on a ridge to valley formation. The soil is 29.80% of the CCA are very deep (More than 90 cm.). In 35.8 % of the area, the soils are deep (45 to 90 cm.) and in 34.4 % are they moderately deep (22.5 & 45 cm.). The soil colors vary from yellowish brown to dark brown in the surface and subsurface. The texture of surface soil up to 30 cm. is about 23.8 % is fine and, in 76.2 % it is medium. The surface & subsurface layers thus predominantly consist of medium to fine texture followed by weathered basaltic material (murrum).

#### Cropping Pattern

The cropping pattern was expected to immerge under irrigation condition, which has been adopted for planning the irrigation system as shown in **Table 2**.

**Table 2** Original Cropping Pattern

Sr. Kharif	Crop	Designed Area in %	
1	Paddy	34.4	88.3
2	Juwar	7.4	
3	Hill millet	7.6	
4	Kodara	2.1	
5	Other	1.2	
6	Grass	35.6	
Rabi			
7	Wheat	1.2	7.2
8	Vegetables	0.4	
9	Spices & condiments	0.6	
10	Pulses	5.0	
Two Seasonal			
11	Cotton	1.7	8.3
12	Pulses	6.6	
<b>TOTAL</b>			<b>103.80</b>

(Source: Sub-division office, Kelia, 2011)



The statement as shown in **Table 3** on the cropping pattern observed during the decade of 2001 to 2010 thus indicating the average of crops being cultivated in the command of Kelia Irrigation Project.

**Table 3** Planned against existing cropping pattern in Kelia command area

Sr. No.	Season	Name of Crop	Planned Crop Pattern Area in		Average crop pattern during 2001-2010	
			Area in		Area in Ha	Area in % to Revised CCA
			% to CCA	Area in Ha		
1	Kharif	Paddy	34.40	853.12	78.95	3.57
2		Juwari	7.40	183.52	0.00	0.00
3		Hill Millet	7.60	188.48	0.00	0.00
4		Kodra	2.10	52.08	0.00	0.00
5		Others	1.20	29.76	0.63	0.03
6		Grass	35.60	882.88	0.07	0.00
7	Rabi	Paddy	0.00	0	<b>194.39</b>	<b>8.80</b>
8		Pulses	5.00	124	0.00	0.00
9		Spices & Condiments	0.60	14.88	0.00	0.00
10		Wheat	1.20	29.76	2.89	0.13
11		Juwari/Bajri	0.00	0	<b>249.17</b>	<b>11.27</b>
12		Ground nut	0.00	0	<b>22.15</b>	<b>1.00</b>
13	Hot weather	Others	0.00	0	<b>157.47</b>	<b>7.13</b>
14		Paddy	0.00	0	<b>174.14</b>	<b>7.88</b>
15		Juwari/Bajri/Others	0.00	0	<b>171.19</b>	<b>7.75</b>
16	Two season	Cotton	1.70	42.16	0.00	0.00
17		Pulses	6.60	163.68	0.00	0.00
18		Vegetables	0.40	9.92	32.12	1.45
19	Perennial	Sugarcane	0.00	0	<b>222.77</b>	<b>10.08</b>
20		Banana & Other	0.00	0	<b>41.67</b>	<b>1.89</b>
<b>TOTAL</b>			<b>103.80</b>	<b>2574.24</b>	<b>1347.57</b>	<b>60.98</b>

The table depicts the changes (in bold letters) not only in the cropping pattern but also reveals the less efficiently irrigated land. Against a total planned area of 2,574.24 Ha., at present only about 60% area is being irrigated. The farmers are practicing a completely modified cropping pattern, and the same may result in the decreased area under cropping. It is observed that almost 50% of cropping pattern has revised that include the introduction of Sugarcane and banana that require regular watering round the year.

A revision in the planned allocation of water along with modernization of canal system may be anticipated shortly to keep the tribal area involved in agricultural activities else these areas will be forced to turn up into urbanization, creating demand on other resources at large becoming consumers instead of producers.

**Table 4** suggests on constant switching over rather a reduction in CCA from initial 103% to 60% and now, based on current cropping practices, another reduction to 56%. It

means, little-irrigated area generating more water demands; in other words, existing capacities are not sufficient to take care of originally planned CCA with ongoing practices. According to IBRD recommendations, fortnightly crop water requirements are estimated by the Modified Penman Method (FAO publication no. 24, revised 1977). These compare

**Table 4** Proposed Cropping Pattern for Kelia Project

Season	Sr. No.	Name of Crops	Proposed Crops CCA in %
Kharif	1	Paddy	4.00
	2	Juwari/Bajri	0.50
	3	Others	0.50
	4	Wheat	0.50
Rabi	5	Juwari/Bajri	12.00
	6	Pulses	0.50
	7	Others	18.00
	8	Paddy	9.00
Hot Weather	9	Ground Nut	1.00
	10	Others	9.00
	11	Cotton	0.50
Two Season	12	Vegetables	2.00
	13	Sugarcane	15.00
	14	Banana & Other	1.50
<b>TOTAL</b>			<b>56%</b>



favorably with the experimental results obtained by the Agriculture University, Navsari. IMD stations at Surat record agro-meteorological data that may be used for crop water requirement. Recorded data used are (1) maximum and minimum temperature, (2) maximum, minimum, and relative humidity, (3) wind speed and (4) sunshine hours/ cloud cover. For crop water requirements for Kelia System, data of IMD station at Surat may be considered. The fortnightly crop water requirements may be worked out considering the above aspects and proposed new cropping pattern and accordingly, the canal system revision shall be proposed.

### Irrigation Efficiencies

Low irrigation efficiency observed at Kelia Irrigation System is due to seepage loss (through the joints of precast blocks in the sides of canal section) for the conveyance of water field application loss and deep

percolation loss below the root zone of the crops due to the soil characteristics. The irrigation system passes through mainly areas with murram that have a high coefficient of permeability. However, the reaches where the seepage losses are excessive, the canals should be lined. So far there has been constructed lining works through precast concrete blocks on the side slopes in the branch canal where expected seepage losses as envisaged to be high. Also, some improvement in the field channels has also been observed with the Participatory Irrigation Management (PIM) which in turn improves the efficiency of the entire system to some extent. At present, the irrigation efficiency is envisaged to be around 49% whereas for the future needs the efficiency needs to be increased to 63% to cater the irrigation water requirements for the present and proposed cropping pattern. The discharge discussed hereafter is based on the revised cropping pattern and anticipated

**Table 5** Water requirement based on proposed cropping pattern

Season	Sr. No.	Name of Crops	CCA in %	CCA in Ha.	NIR WR	TOTAL
Kharif	1	Paddy	3.57	78.95	NIR WR	193 0.15
	2	Juwari Bajri Other	0.00	0.00	NIR WR	7 0.00
	3	Others	0.03	0.63	NIR WR	0 0.00
Rabi	4	Wheat	0.13	2.89	NIR WR	500 0.01
	5	Juwari Bajri	11.27	249.17	NIR WR	286 0.71
	6	Pulses	0.00	0.00	NIR WR	343 0.00
Hot Weather	7	Others	15.92	351.85	NIR WR	278 0.98
	8	Paddy	7.88	174.14	NIR WR	1378 2.40
	9	Ground Nut	1.00	22.15	NIR WR	612 0.14
Two Season	10	Others	7.75	171.19	NIR WR	541 0.93
	11	Cotton	0.00	0.00	NIR WR	359 1.30
	12	Vegetables	1.45	32.12	NIR WR	594 0.19
Perennial	13	Sugarcane	10.08	222.77	NIR WR	1198 2.67
	14	Banana & Other	1.89	41.67	NIR WR	1184 0.49
<b>TOTAL</b>			60.97	1347.51	WR	<b>8.67 MCM</b>
<b>GIR (in MCum ) with Overall Project Efficiency</b>					GIR	<b>17.70 MCM</b>
<b>Maximum Discharge Required</b>						<b>47.07 Cusecs</b>

(NIR – Net Irrigation Requirements, WR – Water Requirement, GIR – Gross Irrigation Requirement)



improved efficiencies of the canal carrying capacities **Figure 5** shows the water requirement based on the cropping pattern.

### Canal Capacities

Presently, the K.L.B.B.C. is found to carry the design discharges without encroaching on the free board. The conveyance capacity of the canal in the Kelia project command to meet the peak demands of irrigation are not required to be increased to the irrigation demand in different months; however some improvement is proposed. The water carrying capacity of canal system needs to be modified as the system is already carrying 47.07 Cusecs of Discharge at present instead of the designed discharge of 59.14 Cusecs (2.07 Cumecs) as planned.

Based on the proposed cropping pattern it is envisaged that the capacity of Main Canal needs no modifications as it can cater 59.14 Cusecs to compared to required 47.07 Cusecs in anticipated improved condition (for irrigation purpose). However, the modification is not proposed in the systems of Kelia Project Canal System and also in some of the distributaries wherein modification is proposed to cater the required irrigation water carriage. In the sub-systems of Kelia Branch Canal, individual increased water carriage requirement shall be achieved by various means as of full lining works, further implementation of PIM and

partly lining works reducing percolation losses and improvement of canal structures as a way of reducing afflux and improving system efficiency at field level. Following is a computed statement for maximum discharge requirements based on actual cropping pattern and for the proposed cropping pattern.

So far as the water availability is concerned, the Live Storage of the project is 17.35 MCM, which is not required to be modified to catch the other flood waters for utilization considering the proposed cropping pattern and improved conveyance efficiencies. **Tables 6 & 7** show the revised discharge requirements based on the proposed cropping pattern and improved conveyance efficiencies.

### Conclusion

The Kelia water resource project is serving villagers of the tribal region as an important aid for cultivation and agricultural activities. The soils derived from the volcanic Deccan trap and the terrain result in a high rate of surface run-off. Over the years, the changes in cropping pattern have affected the irrigable area and the efficiency of the irrigation system. Water demands have increased against a reduction in CCA with a change of crop types. Up to an extent through PIM, customized discharge from canals may help the sector. Based on observed changes in cropping pattern, a

**Table 6** Revised Discharges in Systems of Left Bank Branch Canal

Sr. no.	Name of Canal (XX canal Ex. canal)	Off taking Mt.	Original Discharge Cusecs	Revised Discharge Cusecs
1	Kelia Main and Left Bank Main Canal	0	17.20	1.24
2	Mandav Khadak Minor No. 1 Ex. KLBBC	1866	3.89	1.26
3	Mandav Khadak Minor No. 2 Ex. KLBBC	2370	10.77	2.58
4	Mandav Khadak Sub Minor No. L-1 Ex. Mandav Khadak Minor No. 2	1050	1.33	0.29
5	Mandav Khadak Sub Minor No. R-2 Ex. Mandav Khadak Minor No. 2	1350	3.10	1.45
6	Mandav Khadak Sub Minor No. L-3 Ex. Mandav Khadak Minor No. 2	1600	1.33	0.36
7	Mandav Khadak Sub Minor No. R-1 Ex. Mandav Khadak Minor No. 2	3620	1.33	0.30
8	Mandav Khadak Sub Minor No. R-5 Ex. Mandav Khadak Minor No. ?	4790	1.33	0.86
9	Mandav Khadak Sub Minor No. R-6 Ex. Mandav Khadak Mr. No. 2	5520	1.33	0.22
10	Mandav Khadak Sub Minor No. L-7 Ex. Mandav Khadak Mr. No. 2	6257	1.33	0.25
11	Mandav Khadak Sub Mr. No. R-8 Ex. Mandav Khadak Mr. No. 2	6407	1.33	0.30



12	Mandav Khadak Minor No. 3 Ex. KLBBC	2850	1.33	0.35
13	Mandav Khadak Minor No. 4 Ex. KLBBC	3450	1.33	0.19
14	Singarveri Minor Ex. KLBBC	4800	1.19	0.70
15	Miyazari Minor No. 1 Ex. KLBBC	6700	1.33	0.41
16	Miyazari Minor No. 2 Ex. KLBBC	6900	3.92	0.72
17	Miyazari Sub Minor No. 1 Ex. Miyazari Mr. No. 2	75	1.33	0.59
18	Miyazari Sub Minor No. 2 Ex. Miyazari Mr. No. 2	390	1.33	0.89
19	Miyazari Sub Minor No. 3 Ex. Miyazari Mr. No. 1	1800	1.33	0.36
20	Ghodvani Minor No. 1 Ex. KLBBC	7470	3.92	1.49
21	Ghodvani Sub Mr. No. 1 Ex. Ghodvani Mr. No. 1	1550	1.33	0.93
22	Ghodvani Minor No. 2 Ex. KLBBC	7830	1.33	0.11
23	Ghodvani Minor No. 3 Ex. KLBBC	8010	1.88	0.16
24	Ghodvani Minor No. 4 Ex. KLBBC	8370	3.09	0.34
25	Ghodvani Minor No. 5 Ex. Ghodvani Minor No. 4	1620	1.33	0.18
26	Ghodvani Sub Minor No. 1 Ex. Ghodvani Minor No. 4	626	1.33	0.68
27	Ghodvani Sub Minor No. 1 Ex. KLBBC	8570	1.33	0.30
28	Dholumbar Minor Ex. KLBBC	8670	17.55	1.03
29	Dholumbar Sub Minor No. 1 Ex. Dholumbar Minor	995	2.54	0.19
30	Dholumbar Sub Minor No. 2 Ex. Dholumbar Minor	1110	2.54	0.33
31	Dholumbar Sub Minor No. 3 Ex. Dholumbar Minor	1980	2.54	0.24
32	Dholumbar Sub Minor No. 4 Ex. Dholumbar Minor	2450	2.54	0.22
33	Dholumbar Sub Minor No. 5 Ex. Dholumbar Minor	3020	2.54	0.59
34	Godthal Minor Ex. Dholumbar Minor	2240	2.54	0.55
35	Dholumbar Sub Minor No. 6 Ex. Dholumbar Minor	4300	2.54	0.20
36	Agassi Sub Minor No. 1 Ex. Dholumbar Minor	4300	2.54	0.45
37	Agassi Sub Minor No. 2 Ex. Dholumbar Minor	4650	2.54	0.61
38	Rumla Minor No. 1 Ex. Dholumbar Minor	5040	2.54	1.59
39	Rumla Sub Minor No. 1 Ex. Rumla Minor	90	2.54	0.50
40	Rumla Minor No. 2 Ex. Dholumbar Minor	5470	2.54	1.26
41	Rumla Minor No. 3 Ex. Dholumbar Minor	6060	2.54	0.47

Table 7: Revised Discharges in Systems of Right Bank Branch Canal

Sr. no.	Name of Canal (XX canal Ex. canal)	Off taking Mt.	Original Discharge Cusecs	Revised Discharge Cusecs
1	Kelia Right bank branch Canal (DO)	0	36.51	0.69
2	Kelia Mr. Ex. Kelia Right Bank Branch	150	2.50	0.65
3	Velanpur Mr. Ex. Kelia Right Bank Branch	1865	2.60	1.86
4	Velanpur Sub Mr. Ex. Velanpur Minor	2100	1.23	0.66
5	Kakadvel Sub Mr. Ex. Velanpur Minor	3300	1.23	0.82
6	Ambach Mt. Ex. Kelia Right Bank Branch	3324	1.23	1.52
7	Ambach Sub Mr. Ex. Ambach Minor	5100	6.04	0.34
8	Ambach Sub Mr.no.2 Ex. Kaushatia Minor No. 1	2800	1.23	0.64
9	Ambach Sub Mr. no.3 Ex. Ambach Sub Mr. No. 2	400	2.54	0.33



10	Sukhabari Mr.no.1 Ex. Kelia Right Bank Branch	2258	4.48	0.36
11	Sukhabari Mr.no.2 Ex. Kelia Right Bank Branch	3953	1.23	0.32
12	Sukhabari Sub Mr. no.1 Ex. Ambach Minor	1480	6.22	0.34
13	Sukhabari Sub mr.no.2 Ex. Ambach Minor	3240	1.23	0.36
14	Kansharia Mr. no. 1 Ex. Kelia Right Bank Branch	4590	2.54	1.05
15	Kansharia Mr. no. 2 Ex. Kelia Right Bank Branch	5010	1.23	0.55
16	Kansharia Mr. no.3 Ex. Kelia Right Bank Branch	5230	1.23	0.64
17	Kansharia Mr. no. 5 Ex. Kelia Right Bank Branch	7020	1.23	0.18
18	Kansharia Sub Mr. no. 1 Ex. Kansharia Minor	1700	2.54	0.35
19	Kansharia Sub Mr. no. 1 Ex. Kansharia Minor No. 1	3500	1.23	0.65
20	Kansharia Sub Mr.no.3 Ex. Kansharia Minor No. 3	930	1.23	0.27
21	Saravni Mr. Ex. Kelia Right Bank Branch	7560	3.11	1.40
22	Saravni Sub Mr. Ex. Vandervela Sub Minor No. 1	800	1.23	0.45
23	Vaghabari Sub Mr.no.1 Ex. Saravni Minor	900	1.23	0.27
24	Saravni Sub Mr.no.2 Ex. Saravni Minor	1800	1.23	0.67
25	Saravni Sub Mr.no.3 Ex. Saravni Minor	2010	0.59	0.62
26	Vandervela Mr. Ex. Kelia Right Bank Branch	7560	3.11	0.83
27	Vandervela Sub Mr.no.1 Ex. Vandervela Minor	2400	1.23	0.94
28	Vandervela Sub Mr. no. 2 Ex. Vandervela Sub Mr. No. 1	450	1.23	0.71
29	Vandervela Sub Mr.no.3 Ex. Vandervela Minor	3800	1.23	0.48

proposed cropping pattern so that there is no need for increasing the canal carrying capacities but to improve the efficiency to avoid further reduction in the cultivable command area. The efficiency may be enhanced by ascertaining remedial measures as to reduce percolation losses, improving cross drainage works reducing afflux and so on. The dam with a live storage capacity of 17.35 MCM can take care of existing practices. However, a revision may be needed in near future to maintain the cultivation and agricultural practices for adhering to originally planned CCA of 103.80% in 2,486 Ha. of the area. A question remains unanswered, whether to continue with cash crops in existing situation of reduced irrigation efficiencies or to go for a complete new system design to promote wealth through cash crop cultivation support.

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