

Study the Financial Implications of Kukadi Canal Irrigation

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Abstract - Conducting research on the costs of the Kukadi Canal Irrigation Project reveals an analysis of the monetary factors related to this hydraulic undertaking. Located at a pivotal juncture in agricultural history, this study examines the project's financial complexities in order to determine its feasibility and the effect it will have on the local economy. This research seeks to uncover the financial aspects that support the long-term performance of the Kukadi Canal by investigating financing mechanisms, ROI, and cost-benefit evaluations. A more complex picture of the interplay between good economic strategy and handling water resources for agricultural development becomes apparent when we analyze the monetary ramifications.

Keywords - Kukadi Canal Irrigation Project, Financial, Economic, Strategy.

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INTRODUCTION

The districts of Pune, Ahmednagar, and Solapur in western Maharashtra are afflicted by water shortage, and the rivers Ghod and Kukadi are the primary sources of irrigation water accessible to these regions. The confluence of Mina and Ghod, a river in the Ambegaon district of Pune, India, occurs close to Nirgudsar. Upstream of Yedgaon in the Tal. Junner district of Pune, the rivers Kukadi and Pushpawati converge. The Western Ghats, namely the Junner and Ambegaon Tahsils in the Pune district, are the precipitation catchment areas for all five of these rivers, which get an annual rainfall of 3810–5080 mm.[1]

In about 32–40 km, the precipitation decreases to around 1000 millimetres. After there, it drops to 635 mm in the 50 km that follow. Crop failures, poor yields, and the seeming poverty of the agriculturists are typical in the traditional rainfall shadow region, which extends eastward beyond the Pune Nasik road and steadily decreases rainfall from 635 mm to 460 mm.[2]

This project was designated to use 1416M.Cum in the original Bhima Project. 1206M.Cum. (42.606TMC.) is the total 75% reliable yield up to the planned dam locations. The government-appointed research team has suggested allocating 1101.50M.Cum. (38.90TMC.) to this project after the announcement of the Krishna Water Dispute Tribunal judgement, and the project is now being designed appropriately. For a long period, the state was concerned about the challenges of delivering irrigation benefits to the drought-stricken areas of the Ahmednagar, Solapur,

and Pune districts. Year after year, shortage affects Parner, Karjat, Shrigonda, and Shirur Tahsils of the Pune District, Karmala Tahsils of the Solapur District, and Ahmednagar District, respectively. If irrigation facilities were made accessible, the lush valleylands could support a variety of crops. Irrigation of many wells in the region has shown this to be true. The rainfall, which ranges from 460 mm to 635 mm and is irregularly distributed, is not enough to support crops.

This occurs for about every other year. Population decline in these tahsils relative to neighbouring Kopargaon and Shrirampur reveals the tract's poverty and the land's unsustainable nature. If the currently planned and underway project does not come to fruition, the whole land will stay undeveloped.[3]

From 1903 to 1910, Mr. Beak, the superintending engineer, focused on researching ways to use the water resources of the three rivers—the Ghod, the Mina, and the Kukadi to irrigate fields in their respective valleys and to help alleviate water scarcity in the areas of the state affected by drought, specifically in the Shrigonda and Karjat tahsils of the Ahmednagar District and the Karmala tahsil of the Solapur District. Several plans to use the water from the aforementioned rivers have been discussed since then.[4]

The state's 1966 project report provides a thorough explanation of the several options considered by Mr. Beak. Building has already begun on the final proposal, which is detailed below. In accordance

with letter number PIM/3465/12050-I.P. from the irrigation department dated 30/04/1965, the Kukadi project report was delivered to C.W. &P.C. Under IP No. PIM/3465/12231-IP (4), dated 08/11/1966, via Appendix no. I (1), the Government of Maharashtra officially authorised this.[5]

Upstream of the Pimpalwandi settlement and the Pune-Nasik road is where you'll find the Yedgaon site. Due to this, the road and the township will be unaffected. However, in comparison to Kandali Village, the foundation conditions here are less than ideal. On the river's right side, you may see exposed rock. [6] It is accessible in the riverbed at a decent depth, nevertheless, and is deeply situated on the left side. Despite factoring in the expense of an extra 7 kilometres of canal in favour of Kandali, preliminary cost calculations show that, even taking submergence into account, the costs at Kandali are still greater than those at Yedgaon, the more expensive foundation.[7]

The location is 2.5 km downstream of the Yedgaon settlement, at 190-10'-30" North and 740-1'-30" East. A cart track departs off the Pune-Nasik road near mile 49/6 and leads to the site, which is about 5 km from the National Highway.[8]

Following careful consideration of all available options, the following design was selected for construction of the Yedgaon Dam in June 1977, marking its last stage of completion. [9] The dam had already reached its maximum storage capacity. The main control is located on the left side, and the Kukadi Left Bank Canal begins at the Yedgaon weir. Nevertheless, the outflow structure is situated on the right side of the river at Ch. 2804m due to the thick overburden and deeply seated rock on the left bank. Since it was determined to be both cost-effective and practical, the earth dam has been divided at this point such that the left side of the outflow has a non-overflow portion.[10]

During the 1977 monsoon, when the lake was filled for the first time, a region downstream of the dam became waterlogged. For this reason, a plethora of relief walls were built in 1979 to address the issue. The formerly flooded land has been extensively restored.[11]

Both the Ar and the Kukadi rivers flow eastward from the separating ranges formed by the two mountain ranges that are offshoots of the Western Ghats; the Kukadi and the Meena rivers flow westward from the same spot. Some of these branches, between the villages of Thakarwadi and Padli, have spurs that come near to the river Kukadi's banks.[12] Therefore, in this reach, we looked at a few other potential dam locations, which are detailed in the previous project report. The project study from 1966, which was authorised by the administration, suggested a location close to the settlement Manikdoh and called for a composite arch with masonry sections in the main gorge and earth embankments on both sides.[13]

The precise coordinates of the dam location are 730° 49' east longitude and 190° 14' north latitude. Located

around 3 km from Junner, the location may be reached via the Junner-Ghatghar road. A gross storage capacity of 308Mcum (10.88 TMC) is planned for the Kukadi River dam near Manikdoh (also known as Thakarwadi).[14] The initial plan is to release the water into the river via six 1.2M river sluices, with an additional 1.8 M available in the spillway section. The plan was to divert this water into the main Kukadi Left Bank Canal by collecting it at the Yedgaon dam, which was already in place downstream.[15]

METHODOLOGY

Selected farmers from various regions of the command area who have reaped the benefits of the Kukadi Canal irrigation are included in the universe. Only three districts Pune, Ahmednagar, and Solapur out of the whole command area were chosen. There are five tahsils that fall under the Kukadi left bank canal, chosen from among the three districts that benefitted. Each Tahsil has had an additional 10% of its villages chosen based on the percentage of farmers who have reaped greater and fewer benefits. Then, from these communities, about 1% of the farmers have been chosen. Stratified random sampling was therefore used for the research. A total of 602 farmers were chosen for the sample.

• Data Collection

The methodology of this study is a field survey. Various sources have contributed to the data set. The secondary data was gathered from many sources, including the irrigation department of the Maharashtra government, district gazetteers, reports, books, the internet, and the Kukadi left bank canal command area.

Selected farmers in the command area provided the main data. The study's requirements dictated the mix of these data sets. We can accomplish our research goals with this data, which have various advantages and disadvantages.

• Tools Of Data Analysis

Primary and secondary data were gathered for this project from 2012–13 to 2021–22. Secondary data is sourced from a variety of sources, including reports from socio-economic surveys, district census handbooks, reports on crops and seasons, district gazetteers, and agricultural statistical information from the agricultural department of Maharashtra. This allows for a more comprehensive understanding of the study's patterns of land utilisation, cropping patterns, trends of production and yield, agricultural efficiency, and indicators of economic development. Primary data was collected using surveys and questionnaires.

RESULTS

Table 1: The effect of watering crops on food yields and household income

Sr. No.	Increase in agricultural production	Quantity	Percentage	Rise in standard of living	Quantity	percentage
1	Yes	534	88.71	Yes	471	78.24
2	No	66	10.96	No	30	4.98
3	Unknown	2	0.33	Unknown	101	16.78
	Total	602	100	Total	602	100

Sr. No.	Increase in agricultural income	Quantity	Percentage
1	Yes	565	93.85
2	No	20	3.32
3	Unknown	17	2.38

Table reveals that 88.71% of farmers saw an increase in agricultural productivity and 93.85% saw an increase in agricultural revenue as a result of canal irrigation. The living standards of 78.24% of the farmers in the command area were raised thanks to the increase in agricultural output and family income.

Table 2: Market and financial resources for agricultural growth

Sr. No.	Availability of capital	Quantity	%	Availability of market	Quantity	%
1	Bank loan	144	23.92	Local	156	25.91
2	Money lender	4	0.67	Local/District	337	55.98
3	Agricultural production	361	59.97	Local/district/state	96	15.95
4	Other occupation	81	13.45	National/international	13	2.16
5	Service	12	1.99			
	Total	602	100		602	100

About 59.97% of farmers in the Kukadi command area utilise their agricultural revenue to invest in agricultural development, according to farmers' opinions. Some of them utilise funds from other sources, such bank loans (23.92%) and other sources of revenue (13.40%), to expand their agricultural operations. Local and district level marketplaces get 81.89% of farmers' agricultural commodities, according to table 5.38. Exporting agricultural items to national or international markets is only done by 2.16 percent of farmers. Pargaon is in the Shrigonda Tahsil of the Ahmednagar district, and its farmers export pomegranates, grapes, and other agricultural products.

Table 3: electricity's use in farming

Sr. No.	Use of electricity	Quantity	Percentage	Available at a time	Quantity	Percentage
1	Yes	583	96.84	Yes	18	2.99
2	No	19	3.16	No	577	95.85
3	Unknown	00	00	Unknown	07	1.16
	Total	602	100		602	100

When it comes to farming, all of the farmers in the canal command area utilise electricity. Nearly all farmers (95.85%) report that their electrical supply is often late. Consequently, agricultural output is negatively impacted. The issue of load shedding is rather serious.

Table 4: Government Scheme Beneficiary Farmers

Sr. No.	Particulars	Quantity	%	Govt. schemes	Quantity	%
1	Yes	499	82.89	Perches of seeds	252	41.86
2	No	103	17.11	Crop loan	206	34.22
3	Unknown	00	00	Crop insurance	84	13.95
4				Perches of fertilizers	60	9.97
	Total	602	100		602	100

• The effect of watering on monetary shifts

These components illustrate how the kukadi project's command region of five Tahsils was affected economically by canal irrigation. In this article, eleven important economic indicators have been used to illustrate the evolution of the study area's economic growth. The technique of Kendall's ranking coefficient has been used for this purpose.

These are the 10 measures of economic development:

1. Bank Number: the ratio of banks to the total population.
2. The number of credit co-operative societies as a proportion of the total population.
3. Transportation infrastructure: road length as a proportion of population.
4. Healthcare facilities number of clinics and hospitals as a proportion of the total population.
5. Number of schools per thousand people is the fifth indicator of educational facilities.
6. The ratio of an area's total income to its whole population is known as per capita income.
7. Proportion in the service sector: a measure of the proportion of the population that is actively involved in the service industry.
8. The literacy ratio is the proportion of the population that can read and write as a whole.
9. 9th, the Industrial Ratio, which is the fraction of the population that works in manufacturing or related occupations.

10. The agricultural ratio is the proportion of the population that works in agriculture as a whole.

For the years 2012–2013 and 2021–22, the table shows how the five Tahsils that were aided by the Kukadi Canal's economic growth were affected by the 10 metrics mentioned above.

Table 5: economic metrics for five Tahsils in 2012–2013

Sr. No.	Economic indicators	Junner Tahsil		Parner Tahsil		Shringonda Tahsil		Karjat Tahsil		Karmala Tahsil	
		%	R	%	R	%	R	%	R	%	R
1	No. of Banks	0.03	4	0.11	1	0.09	2	0.02	5	0.05	3
2	Credit Co-operative society's	1.41	3	2.11	5	1.12	4	1.71	2	2.51	1
3	Road facilities	3.12	2	2.23	3	1.2	5	3.21	1	2.22	4
4	Health facilities	0.20	3	0.12	4	0.42	1	0.21	2	0.02	5
5	Educational Facilities	1.11	3	0.17	5	1.6	2	0.92	4	1.01	1
6	Per capita income	76.3	1	22.12	2	21.13	3	18.10	5	19.12	4
7	Percentage in service sector	14.11	1	4.23	3	2.13	4	7.13	2	1.34	5
8	Literacy ratio	44.13	2	42.13	3	48.18	1	41.13	4	40.10	5
9	Industrial Ratio	6.12	1	4.23	2	1.01	5	2.11	3	1.12	4
10	Agricultural Ratio	34.33	5	43.12	2	40.41	4	41.30	3	45.43	1
	ΣER/N		2.5		3.0		3.1		3.1		3.3

Table 6: Measures of economic growth in five Tahsils in 2021 and 2022

Sr. No.	Economic indicators	Junner Tahsil		Parner Tahsil		Shringonda Tahsil		Karjat Tahsil		Karmala Tahsil	
		%	R	%	R	%	R	%	R	%	R
1	No. of Banks	0.13	4	0.16	1	0.15	2	0.14	3	0.11	5
2	Credit Co-operative society's	3.82	2	3.13	4	3.27	3	4.13	1	2.81	5
3	Road facilities	5.24	3	5.98	2	4.85	5	6.13	1	5.04	4
4	Health facilities	0.42	4	0.47	3	0.53	1	0.49	2	0.16	5
5	Educational Facilities	2.16	1	1.78	3	1.87	2	1.76	4	1.41	5
6	Per capita income	84.8	1	35.50	2	29.59	3	21.29	5	29.10	4
7	Percentage in service sector	8.89	3	12.61	2	18.39	1	6.37	4	4.65	5
8	Literacy ratio	75.2	1	71.51	3	73.44	2	71.22	4	68.66	5
9	Industry Ratio	8.02	2	7.42	4	8.53	1	7.43	3	6.53	5
10	Agricultural Ratio	52.34	4	51.83	3	55.29	2	44.44	5	61.07	1
	ΣER/N		2.3		2.7		2.2		3.2		4.0

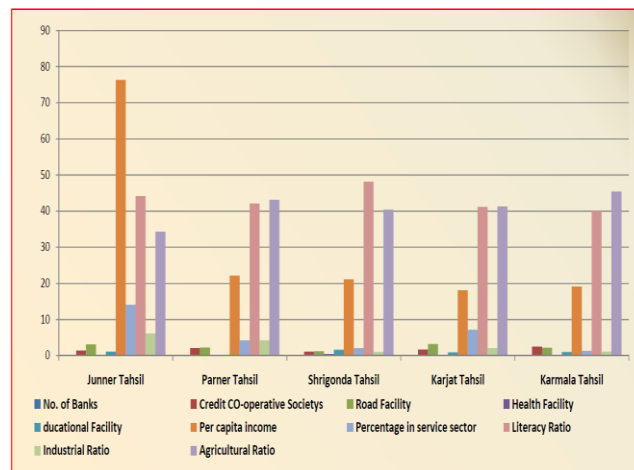


Figure 1: economic metrics for five Tahsils in 2012–2013

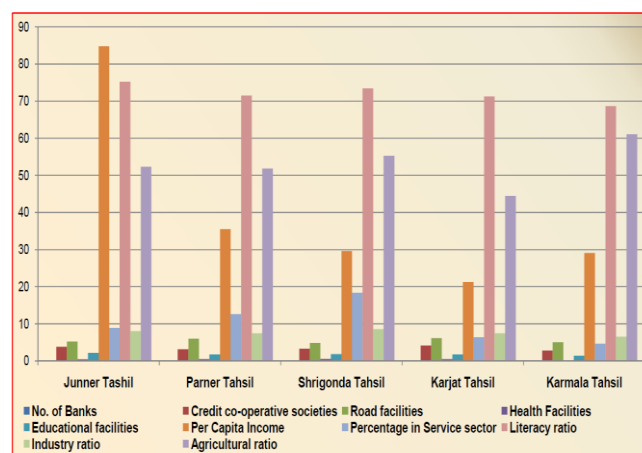


Figure 2: five Tahsils' economic development metrics for 2021 and 2022 Three potential domains for economic growth have been singled out.

a. Highly Progressed Domains

There was no area with very high economic development in 2012–2013, as shown in the table. Currently, much of this area falls within the scarcity region, although it is still undergoing development. Many services, including healthcare, schools, roads, and banks, were severely underdeveloped prior to 2012–2013, according to economic development metrics. With a rise in per capita income, an increase in the number of banks, an increase in the number of schools, and a literacy ratio that is higher than in 2012–13, two Tahsils—Shringarda and JunnerTahsil—lead the high development category in 2021–22. The value of the coefficient is less than 2.5. The lower the value, the greater the development, according to Kendall's technique.

b. Moderately Developed Areas

Junner and Parner Tahsils were the only places this group could be found in 2012–2013. A value of 2.5 to 3.00 is the range of the coefficient. However, Parner Tahsil saw modest economic growth in 2021

and 2022. There is some distributional diversity in the economic indices in 2012–2013, and Parner Tahsil demonstrates modest progress. In terms of modest economic development, Parner Tahsil is now at the top. During this time, advancements were made in areas such as transportation, education, and healthcare. There was a rise in per capita income compared to 2012–2013 (Fig. 5.20). Living standards rose as a result. Cooperative societies became stronger. In this regard, the Tahsil is thus superior.

C. Underdeveloped Regions

Shrigonda, Karjat, and Karmala were three tahsils in 2012–13 that had very poor economic development. In these areas, the coefficient is more than 3.00. In 2021 and 2022, the Karjat and Karmala Tahsils did not see a significant shift in economic statistics. They are at the forefront of slow economic growth. However, during this time, Shrigonda's economic indices improved at a quick pace, and the region saw significant development in 2012 and 2013.

CONCLUSION

The researcher has analysed data acquired from both primary and secondary sources in this chapter. This data analysis was used to observe the changes in agricultural growth in Junner, Parner, Shrigonda, Karjat, and Karmala Tahsils before and after kukadi canal irrigation. While discussing the economic aspects of irrigation, agricultural development, land use patterns, crop combination, and agricultural production. The shifts investigated and researched using graphical representations like as graphs.

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