



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 12, December 2021

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 7.569

 9940 572 462

 6381 907 438

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# Effects of Dam Construction: A Case Study on Mahi Dam Project

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**ABSTRACT:**The Mahi Dam, located on the Mahi River, was erected in 2012 to address the region's water needs. It has demonstrated a 138.5 percent improvement in crop productivity in the region after the dam's completion. There has also been a change in the region's climatic circumstances, with the temperature dropping by 1 degree. The area's land use and land cover were determined using ArcGIS software, as well as the drainage and digital elevation model, which were utilised to determine the region's numerous features. The region's ground water table rises as a result of the dam construction at a certain research area location, increasing the region's water accessible sources. The region's irrigated area expands as a result of greater water supply, adding to economic development.

**KEYWORDS:** Mahi Dam, ArcGIS, Irrigation, Temperature, Rainfall, Groundwater.

## I. INTRODUCTION

The Mahi project, located in the Dhar/Jhabua district, is a significant irrigation project. The building of this project began in 1981 and ended in 2012. The backwater impact of the Mahi dam inundated 10 and 11 villages in Dhar and Jhabua districts, respectively. All required amenities and rehabilitation have been provided to the affected individuals under the specific rehabilitation strategy established by the Madhya Pradesh government for the Mahi project. The height of the Mahi main dam from mean sea level is 451.50 meters (usable water capacity 135.60 mm), with water storage up to 450 meters. Only 6258 hectares under Petlawad tehsil were irrigated through government sources prior to the dam's completion in 2009-10, and further irrigation is now being done in 18,227 hectares solely from the Mahi project. A total of 32039 farmers have benefited as a result of this.

## II. RELATED WORK

[1]Due to increase in climate change there has been an increase in demand for water supply which check dams have proved very efficient. It has been found that check dams has overall increased the groundwater level of the region.[2]research has been done to examine seasonal water quality (pH, turbidity and DO), TDS and electrical conductivity, total hardness, iron chloride, calcium, magnesium alkalinity phosphate, fluoride, total bacterial counts) changes after the dam construction and was found varying in various seasons.[3]The study has shown a loss in wetlands cover due to the construction of the dam , according to a study done on komardanga dam the flood prone areas are reduced by 39.72 percent and water service to the wetlands is unreliable as a result.[4]The goal of this study is to investigate the impact of recharging from a check dam on groundwater quality in the Krishnagiri District of Tamil Nadu State, India. Fluoride concentrations and main ions were measured in water samples from 15 wells in this investigation. The number of main ions found in groundwater was compared to the Bureau of Indian Standards' drinking water guideline values. 38 percent of the groundwater samples collected were unsuitable for drinking because of high levels of salt and fluoride.

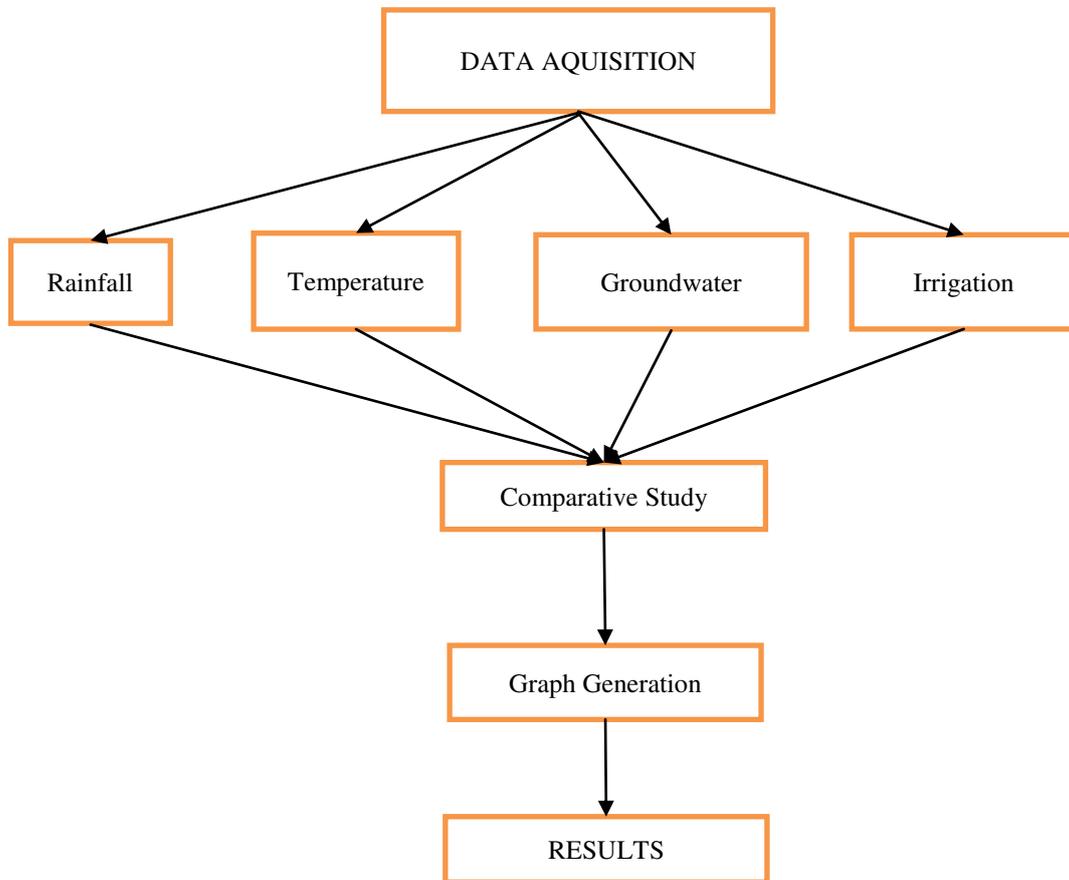
## III. STUDY AREA

The Mahi project is an important irrigation project in the Dhar/Jhabua area. The construction of this structure began in 1981. This dam was built at Labriya village, on the border of Dhar and Jhabua districts, across the Mahi River. With an annual monsoon rainfall of 869mm, the river's catchment area is 754.25 square kilometres. 11180 cumecs is the likely maximum flood required to keep the dam from overflowing. The main dam at Mahi is a masonry and earthen structure with a central spillway that rises 46.40 metres above the foundation. The masonry dam is 390 meters long and 7.5 meters broad, with a total live storage capacity of 135.60 million cubic meters and a gross storage capacity of 199.07 million cubic meters at full reservoir level.



#### IV. METHODOLOGY

The following research uses a case study to look into the effects of dams. Dam effects are considered both before and after construction. For this study, the dam data was obtained from the Mahi dam office in Petlawad, which contains the dam's primary features and consequences. The data is then analysed and arranged in a logical order, with various parameters such as the region's ground water table, changes in irrigation patterns over time as the dam was built, the region's land use and land cover on both the upstream and downstream sides of the dam, and temperature changes being compared. Because the dam was completed in the year 2012, this study was divided into two parts: before the dam was built (before 2012) and after the dam was built (after 2012), hence all of the studies in this paper were compared at that time.



**V. EXPERIMENTAL RESULTS****CHANGE IN RAINFALL**

TABLE 1 SHOWS THE ANNUAL AVERAGE RAINFALL OVER THE AREA FROM BEFORE CONSTRUCTION[1] (2000- 2012) TO AFTER CONSTRUCTION (2012-2020)FOR A DESIRED PERIOD OF TIME:

AVERAGE RAINFALL		
Months	Before Construction(mm)	After Construction(mm)
JAN	0.89	3.565
FEB	1.81	1.77
MAR	0.47	3.8
APR	0.5	2.56
MAY	9.56	1.14
JUNE	105.21	123.25
JULY	283.33	332.42
AUG	312.36	316.7
SEPT	145.37	175.46
OCT	21.26	38.48
NOV	5.49	1.9
DEC	0.54	3.83

TABLE 1

**CHANGE IN TEMPERATURE**

TABLE 2 SHOWS THE CHANGE IN MAXIMUM TEMPERATURE LEVELS[2] BEFORE AND AFTER THE CONSTRUCTION OF THE DAM:

MAXIMUM TEMPERATURE( <sup>0</sup> C)			
	Before Construction	After Construction	Difference
JAN	32.02	31.17	0.85
FEB	35.98	35.04	0.94
MAR	40.05	39.88	0.17
APR	43.25	43.14	0.11
MAY	43.98	44.49	-0.51
JUNE	42.13	43.11	-0.98
JULY	34.73	34.04	0.69
AUG	31.83	30.86	0.97
SEPT	33.71	32.14	1.57
OCT	33.29	31.35	1.94
NOV	31.93	30.27	1.66
DEC	44.34	44.75	-0.41



TABLE 3 SHOWS THE CHANGE IN MINIMUM TEMPERATURE LEVELS BEFORE AND AFTER THE CONSTRUCTION OF THE DAM:

MINIMUM TEMPERATURE(°C)			
	Before Construction	After Construction	Difference
JAN	7.83	6.51	1.32
FEB	9.14	9.18	-0.04
MAR	13.58	12.46	1.12
APR	18.62	18.37	0.25
MAY	22.46	23.02	-0.56
JUNE	23.56	23.48	0.08
JULY	22.51	22.3	0.21
AUG	21.64	21.54	0.1
SEPT	15.09	14.91	0.18
OCT	12.32	12.24	0.08
NOV	9.44	7.4	2.04
DEC	7.35	6.07	1.28

TABLE 3

CHANGE IN GROUNDWATER LEVELS

TABLE 4 SHOWS THE VARIATIONS IN GROUND WATER TABLE BEFORE AND AFTER THE CONSTRUCTION[1] OF THE DAM:

AVERAGE GROUNDWATER (m bgl)		
	Before Construction	After Construction
JAN	19.67	17.83
FEB	20.59	18.575
MAR	21.36	20.41
APR	22.49	21.48
MAY	23.55	23.39
JUNE	23.37	22.51
JULY	21.09	18.22
AUG	19.21	13.75
SEPT	17.38	11.91
OCT	17.62	11.67
NOV	17.78	13.84
DEC	19.02	15.67

TABLE 4



## CHANGE IN IRRIGATION PATTERNS

TABLE 5 SHOWS THE CHANGE AND VARIATIONS[3] IN THE IRRIGATION PATTERN OF THE REGION AFTER THE CONSTRUCTION OF THE DAM:

Parameters	Before Construction	After construction
Area Irrigated	6258 Hectares	18227 Hectares
Total Crop Production	275000 Quintals	656000 Quintals
Total Area Increased for Irrigation	0	2490 Hectares
Average Gross Sown Area	3.95 Lakh Hectares	2.49 Lakh Hectares
Average Net Sown Area	3.35	1.9
Average Irrigated Area	0.5	1.48
Average Rainfed Area	3.18	1.01

TABLE 5

## VI. CONCLUSION

The following findings can be drawn from the research:

The yearly average rainfall data after the dam's construction has increased, indicating that the region has received more rainfall since the dam's construction.

After the dam was built, the yearly maximum temperature in the region dropped, thus cooling the climate.

After the dam was built, the annual minimum temperature in the region dropped, lowering the average temperature and therefore cooling the climate.

The ground water level rose by 3.5 metres after the dam was built, refilling the ground water table.

Increase in crop production in the region following the dam construction, as well as a considerable increase in irrigated area due to the presence of excess water.

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