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AN INVESTIGATION ON THE HYDROBIOLOGY OF THE PANNER WATER RESERVOIR IN TRAL, KASHMIR

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ABSTRACT *– This research, which is one of the few here on reservoir biodiversity to come from this area, was designed to get some understanding of the ecology of the artificial reservoir at Panner, which is located in Tral Kashmir. The problem of inadequate water supply in the region prompted the construction of this reservoir between the years 1969 and 1970. At five different locations across the reservoir, we collected water samples in order to conduct chemical tests and plankton research. It was found that the Water Quality Index (WQI) of the reservoir is within the good quality class (50), with all locations having WQI ranging from 27.88 to 29.91 and fulfilling WHO requirements for drinking purposes. This was one of the observations that was made. Using Arc GIS, a bathymetric map was created after the depth of the reservoir was measured at a number of different places. Canonical Correspondence Analysis (CCA), which described the positive correlation of pH, temperature, nitrate, and calcium content with planktonic density, was used to define the connection between ecological factors and plankton density on a hydro biological level. This was accomplished by determining the influence of environmental parameters and plankton density.*

INDEX-TERMS*: – Reservoir, Earthen Bund, Water Chemistry, longitudinal and cross section, Sampling.*

1. INTRODUCTION AND BACKGROUND

Especially in areas with a limited supply of water, the construction of reservoirs is one of the most important prerequisites for making effective use of the existing water resources for agricultural and drinking reasons. Construction of big and small reservoirs focused on establishing storages and diversions to provide drinking water choices to water shortage areas and reduce imbalances in water demand. In light of the fact that there are relatively few reservoirs in comparison to lakes and wetlands, an effort was made to investigate the water chemistry and the dynamics of the plankton in the Panner reservoir. This was done in light of the fact that there are relatively few reservoirs. The Panner reservoir is situated in the hamlet of Panner. It is 8 kilometers distant from the tehsil Tral in the Pulwama district. It has a height of 2029 meters above mean sea level and is located at 33 degrees 55 minutes 138 seconds north and 75 degrees 10 minutes 565 degrees east. A spring located in the area known as "Haji naad" serves as the water supply for the Panner reservoir. 6.8 meters is the deepest point that can be reached in the reservoir. In 1969 and 1970, the Panner reservoir was built with a storage capacity of 23115.4 m3, and it now provides irrigation services to 16.19 hectares of land in the settlements of Panner, Jagir, and Mundoora. For the

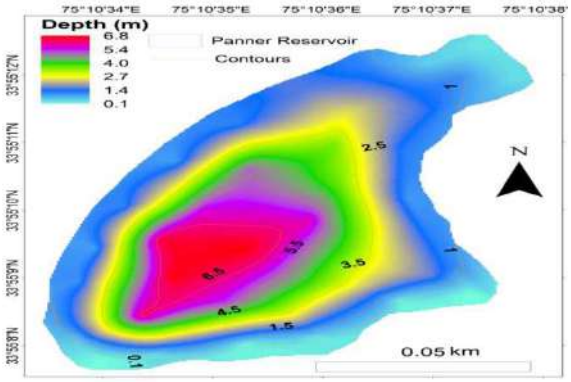
purpose of this research, four different sample stations were chosen inside the reservoir after taking into consideration the overall size of the water source.

About reservoir:-

A typical irrigation tank is a relatively modest storage reservoir that is constructed in a valley across from a stream. On occasion, these tanks could have their own separate catchments, and they might get their water supply from the runoff that occurs in the catchment regions. These tanks are completely reliant on the precipitation that falls within their catchments. In addition, some storage facilities may contain a supply canal that leads to an adjacent stream that has a consistent flow of water.

Earthen bunds:-

The earthen bund, also known as an earthen dam, is a kind of embankment dam that is used often and is composed of dirt or soil for the most part. Since the beginning of human civilization, earth dams have been constructed, however up until very recently, these dams were planned and erected based on precedent. They were constructed using the natural resources, with a minimum of processing, and with rudimentary machinery; yet, in the ancient times, the cost of conveyance and dumping of the dam materials was fairly significant. The cost of transporting and putting down the materials for the dam, on the other hand, has been significantly cut down thanks to recent technological advancements in earth-moving equipment. They nevertheless cost less despite the fact that they made use of resources that were accessible in the area and needed less skilled work to produce.



One definition of a small irrigation tank is one that irrigates an area of land that is less than or equal to 2,000 hectares in size. During each and every wet season, the surface runoff transports a significant quantity of silt into the reservoir. The silt that has accumulated over the years causes the reservoir's storage capacity to decrease. By elevating the sill level of the waste weir, it is possible to either recover or augment the previously lost storage capacity. The slope of the earthen bund, both upstream and downstream, may have been changed, and there is a possibility that erosion has occurred on the downstream side of the bund as a result of poor maintenance. In order to repair the degraded portion of the earthen dam, it is given the requisite form, free board, and top width. Depending on the circumstances, it may also be required to raise the level of the bund. It is now required to both rebuild the earthen bund that has been eroded and improve the capacity of the reservoir's storage space. The repair of the small irrigation tank is the name given to this procedure.

2. PLACE OF WORK

The Panner reservoir is situated in the hamlet of Panner. It is 8 kilometers distant from the tehsil Tral in the Pulwama district. It has a height of 2029 meters above mean sea level and is located at 33 degrees 55 minutes 138 seconds north and 75 degrees 10 minutes 565 degrees east. A spring serves as the water supply for the Panner reservoir 16.19 hectares of land spread over the communities of Panner Jagir and Mundoora. For the purpose of this research, four different sample stations were chosen inside the reservoir while keeping in mind the overall size of the reservoir.

1. Panner tral Jammu and Kashmir.
2. NIT Srinagar.
3. Govt. Degree College Anantnag.

3. OBJECTIVES OF THE STUDY

1. To increase the storage of the tank.
2. To draw the contour map of storage reservoir.
3. To enhance the properties of bund of storage reservoir.

4. Des-sedimentation of the reservoir.
5. To learn more about the properties of the water that has been held in the reservoir.
6. To ensure that the water is fit for consumption.
7. To investigate the state of the water with regard to its sanitization and health implications.
8. To examine the many characteristics of the water's quality.
9. To do research on the pollution caused by the rain
10. Investigate how the changing of the seasons affects the microbial makeup of the water.
11. Acquire an understanding of the factors that affect the microbiological water quality and locate evidence for each of those factors.
12. Determine methods for estimating the amount of water that is available in the reservoir system as well as the amount of water that is lost, and make use of these estimations to devise methods for quantifying the amount of water that is consumed for agricultural purposes.
13. In order to lessen the impact of secondary pollution, find a solution to the problem of rusty water, and improve the quality of drinking water all at the same time.

4. RESEARCH METHODOLOGY

➢ Design of earth dams

The design of an earth dam consists primarily of determining such a cross-section of the dam that, when constructed with the materials that are available, will fulfill its required function with adequate safety. In other words, the design of an earth dam is determined by a dam's "cross-section." For estimating the cross-section of an earth dam there are no mathematical analyses or equations, the cross-section of an earth dam nonetheless relies on the following factors:

Factors essential to the framework

1. The availability of the building supplies within a fair range of time and cost.
2. Physical characteristics of the materials that may be used in the building of the structure.
3. Different categories of earth moving equipment.
4. Construction timetable and factors of the diversion.
5. Climatic factors in connection to placement moisture content regulation, future moisture content fluctuations etc.
6. Security in light of the fact that there might be seepage.

➢ Crest Width:

The crest width of an earth dam is defined simply by the necessity of highway at the top of the dam. In general the crest width ranges from 6 to 12M, with bigger dimensions being used for the taller and more significant dams. A minimum of 3m crest width has to be given to accommodate maintenance work.

➢ Side slopes:

The standard operating procedure stipulates that, on the basis of previous experience with dams of a comparable kind, side slopes are taken into consideration, and, when the stability study has been completed, they are altered, if required. The physical characteristics of the materials used in the building of a dam, the robustness of the foundation, and the kind of dam all have a role in determining the slopes of the dam's side slopes. The physical characteristics of the materials used in the building of the dam are a primary factor in determining the degree to which the side slopes of the dam are stable.

➢ Free Broad:

It is the difference in elevation between the crest of the dam and the MWL in the reservoir that will determine when the greatest flood will occur. This difference is referred to as the free broad. To determine how much free board is required, it is necessary to make the assumption that the reservoir will be at its fullest level when the highest possible waves will also be occurring at the same time. This is done to ensure that the dam will not be overtopped in any way, shape, or form under any circumstances. The safety factor should be included on top of the

minimum free board requirement of 1.5 times the wave height.

- **Capabilities of storage**

If the tank contains more than one irrigation sluice, the usable storage capacity, also known as the live capacity of the tank, refers to the amount of water that the tank is capable of holding between the Full Tank Level (FTL) and the level of the sluice with the lowest water level.

The capacity may be determined using the cone formula if the area of water distributed at the FTL contour is A and the level difference between the lowest sluice sill and the FTL is h.

V=(Axh)/3

Water Quality Parameters.

1. Check the pH value of water sample collected from the reservoir

Results:-

1. The pH level of the sample of water has been measured and found to be **8.5.**
2. Alkalinity

Observations:-

S.NO	VOL.OF SAMPLE (ML)	INITIAL BURRETE READING	FINAL BURRETE READING	DIFFERENCE
1	50	18.6	20.4	1.8
2	50	20.5	22.7	2.2
3	50	38.5	40.30	1.8
4	50	40.40	42.20	1.8
5	50	43.30	45.30	2.0

Results:-

1. The analysis of the phenolphthalein sample to determine the alkalinity of the water **0 mg/l .**
2. The overall alkalinity of the water sample, which is defined as the (Total Alkalinity) = **38.4 mg/l .**

3. Acidity

Tabulations:-

Description	Trail No	Burette Reading		Volume of NaOH Used
		Initial	Final	
Sampling	1	22.4	23.1	0.72
	2	23.2	23.9	0.73
	3	23.9	24.6	0.69
	4	30.75	31.5	0.75
	5	39.80	40.60	0.80

Results:-

1. The amount of acidity, expressed in mg/L as CaCO3, **equals 7.54 mg/l**

4. Hardness

Observations:-

Details of parameter	Vol. of sample (ml)	Initial reading	Final reading	Vol .of EDTA (Ml)
Total hardness	50	9.20	22.10	12.90
		22.20	34.20	12.0
		34.20	50.10	15.90
		50.10	70.10	20.0
Calcium hardness	50	6.0	7.5	1.5
		7.2	8.85	1.65
		0	1.4	1.4
		1.4	2.75	1.35

Results:-

1. Total hardness as $CaCo_3$ **(**mg/l **=65.5 mg/l**
2. Calcium hardness as $CaCo_3$ **= 39.0 mg/l**
3. Magnesium hardness **= 26.50 mg/l**

5. Chloride content

Observations and tabulation:-

Description	Trail No	Burette Reading		Volume of silver Nitrate(ML)	Chloride in mg/L
		Initial	Final		
Sampling	A	14.00	21.25	7.25	181.24
	B	21.20	28.21	7.01	175.24
	C	28.20	35.43	7.23	180.75
	D	16.10	24.25	8.15	203.74
	E	24.20	32.23	8.03	200.74

Calculations:-

Chloride in Mg/L= $\frac{(V1-V2) \times N \times 35.46 \times 1000}{V}$

Results:-

1. The chloride concentration in the water sample collected from the reservoir was equal to **188.342 Mg/l .**

5. CONCLUSION

The surrounding population has access to high-quality drinking water thanks to the reservoir, which was built to preserve water purity. Plankton dynamics were discovered to be influenced by the physic-chemical properties of the reservoir, which calls for more study and monitoring of the reservoir to determine how the plankton community reacts to the presence of fish and changes in the water chemistry that lie in the future.

From this study we got the fallowing conclusion about the reservoir:-

- The DO was found satisfactory according to WHO and LCMA standards that means there is the possibility of aquatic life in the reservoir.
- All the lab tests were performed according to WHO standards.
- The results from the lab tests were satisfactory.
- The water stored in the reservoir is fit for domestic purposes according to WHO standards.
- The stability of the bund was found to be stable.
- The water can easily irrigate the downstream side agricultural land, as the quality of water is satisfactory according to ICMR.

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