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ANALYSIS OF WQI IN SASTHA KOVIL RESERVOIR, RAJAPALAYAM, VIRUDHUNAGAR DISTRICT

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Abstract:

The surface water bodies are the basic sources of water for human activities. Now-a-days, these are under severe environmental stress and are being threatened as a consequence of developmental activities. Reservoir water is the main source of water thus having an important role in urban water systems, accounting for 90% of total urban water supply.In the present study, various physico-chemical parameters such as temperature, pH,TDS,BOD,DO, free CO_2, Total hardness, calcium hardness, magnesium hardness, chlorinity, alkalinity were studied in order to assess the water quality.Using these parameters,WQI (Water Quality Index) was calculated to check the health of the ecosystem.

Key words: Water quality,WQI,Physico-chemical parameters,pollution.

Introduction

Reservoirs are the shallow bodies of water used for storing water for future especially for community supply,Irrigation and furnishing power etc. The water quality in reservoirs is determined using biological and physico-chemical parameters in the water column. These parameters, in turn, are described by the natural and anthropogenic processes involved within the same ecosystem (Castro *et al*.2018).

The need to study surface water quality is one of the major issues today due to increasing the load of pollution from industrial, commercial and residential with its effects on human health and aquatic ecosystems. Several methods are available to analyze the water quality data that changes depending on informational goals, the type of samples, and the size of the sampling area. Water quality index, found to be an efficient and useful method for assessing the water quality.WQI contributes to the management of water resources by facilitating the understanding of data generated in the evaluation of water quality parameters (Howladar *et al*. 2017).

Material and Method

Study area

The area selected for the present study is Sastha kovil reservoir located 7 km away from Rajapalayam,Virudhunagar district. This site is located inside the sanctuary. The water resources are coming from Nagariyar river.This is a famous tourist spot for the people living in the East part of Virudhunagar District. The total depth of the dam is about 36 feet. Nearly 9 villages are benefited from this dam water. This water is used for bathing, washing clothes, cattle washing and the irrigation process. Fish capture is also done seasonally.

Methodology

The surface water samples will be collected fortnightly from Sastha Kovil reservoir to study various physico-chemical parameters such as pH (digital pH meter), TDS (Gravimetric Method),BOD,DO(Winkler's method), free CO_2, Total hardness, calcium hardness, magnesium hardness, chlorinity, alkalinity(Titrimetric methods) will be analysed using standard procedures(APHA,2005). Water Quality Index(WQI) was calculated using the weighted Arithmetic index method as described by cude, 2001.in this method, the various water quality components are multiplied by a weighting factor and are then aggregated using simple arithmetic mean.

Results and discussion

The various physico-chemical parameters such as temperature, pH, total dissolved solids, biological oxygen demand, dissolved oxygen, total hardness, chlorinity, alkalinity, salinity and free carbon-di-oxide were analysed to check the water quality and presented in the graph 1-10.Month Wise variations of Water Quality Index in Sastha Kovil Reservoir and water quality rating were given in tables 1, 2,3and 4.The WQI rating in the present study was given based on Qureshimatva *et al*., 2015.

Table.1. Comparison of monthly variations of various physico- chemical parameters in Sastha Kovil reservoir with BIS Standards.

S.NO	PARAMETERS	OBSERVED VALUE			BIS standards
		Jan	Feb	Mar	
1	pH	6.3	7.0	7.0	6.5-8.5
2	TDS (mg/l)	25.2	25.9	25.9	500
3	BOD(mg/l)	2.6	2.9	2.9	5
4	DO(mlO2/l)	3.23	3.42	3.42	5
5	TOTAL HARDNESS(mg/l)	54	56	56	300.3
6	CHLORINITY(mg/l)	0.052	0.056	0.056	250.8
7	ALKALINITY(mg/l)	13	17	17	200

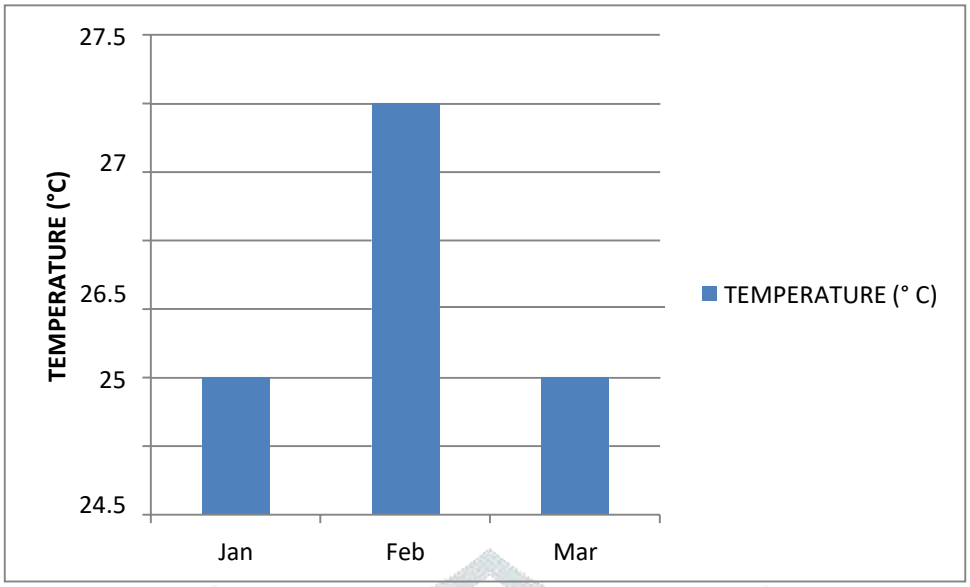

Fig1: Monthly variations of Temperature in Sastha Kovil reservoir

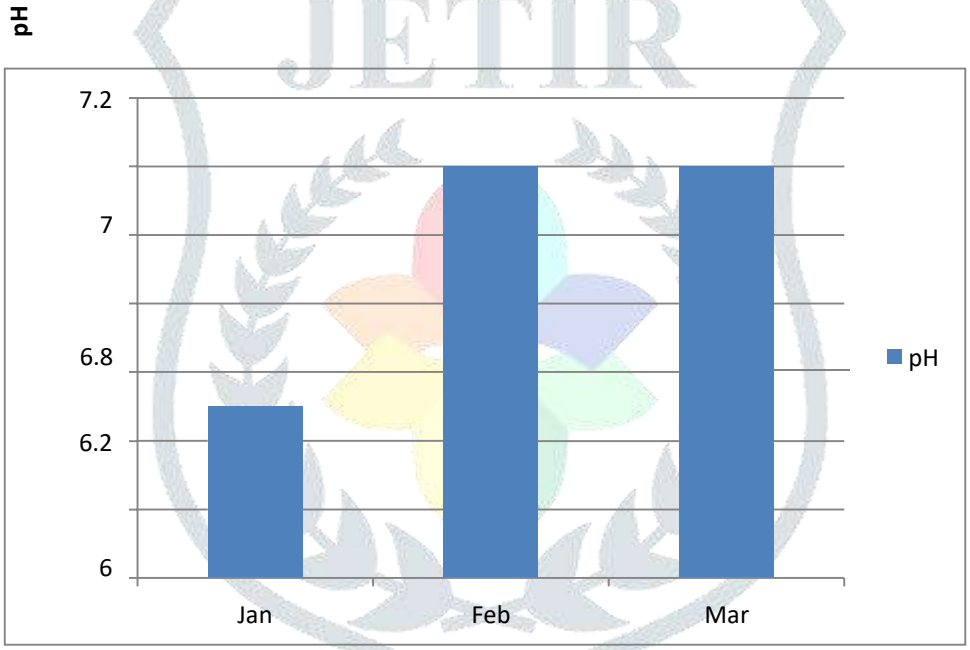

Fig2: Monthly variations of pH in Sastha Kovil reservoir

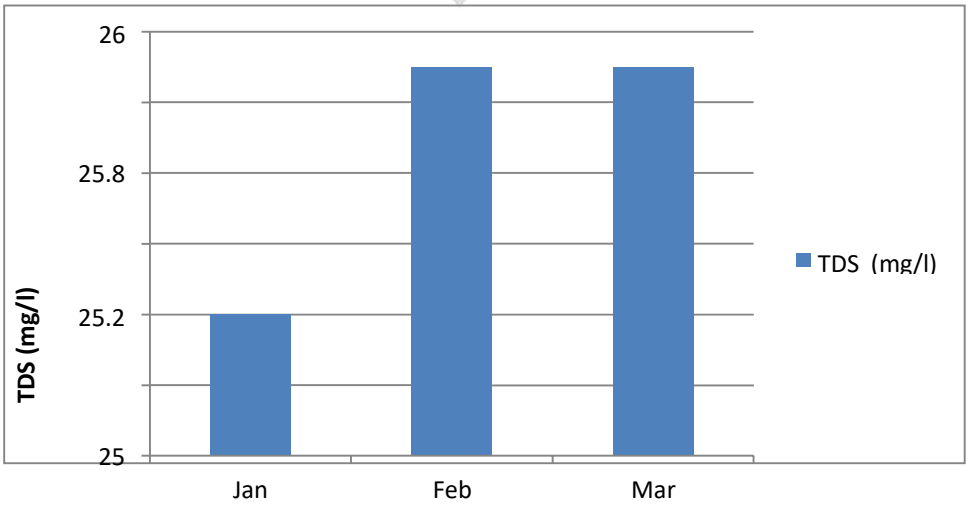

Fig 3: Monthly variations of TDS in Sastha Kovil reservoir

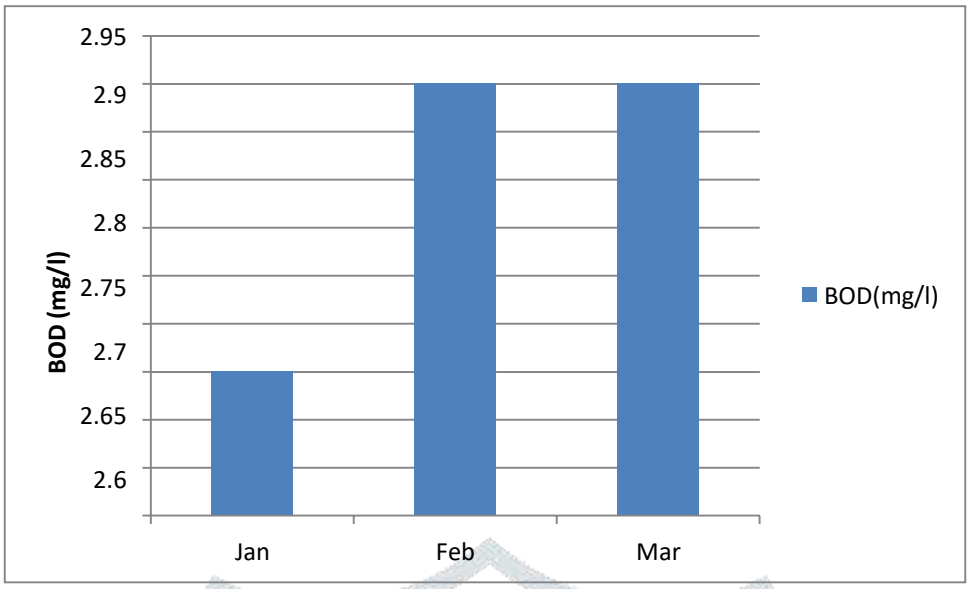

Fig 4: Monthly variations of BOD in Sastha Kovil reservoir

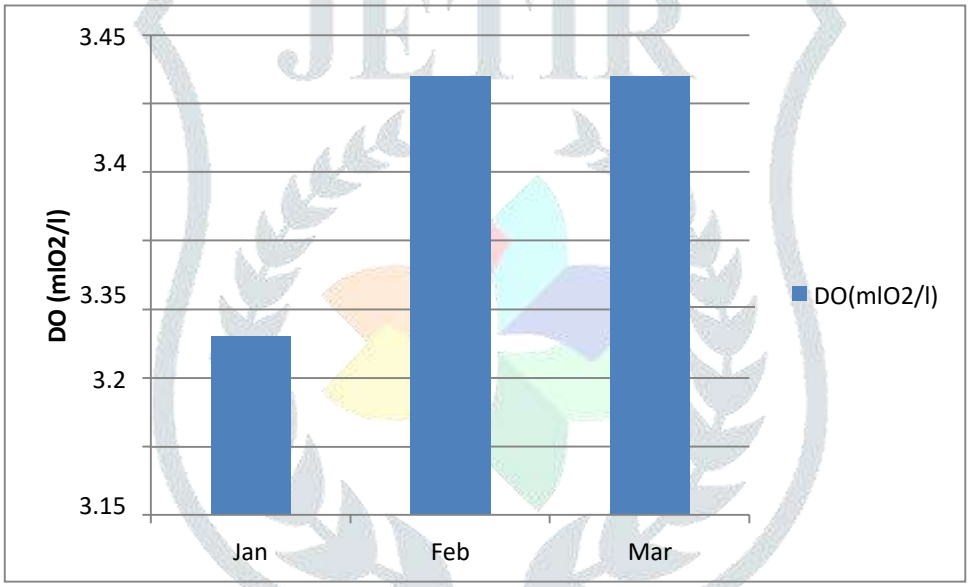

Fig 5: Monthly variations of DO in Sastha Kovil reservoir

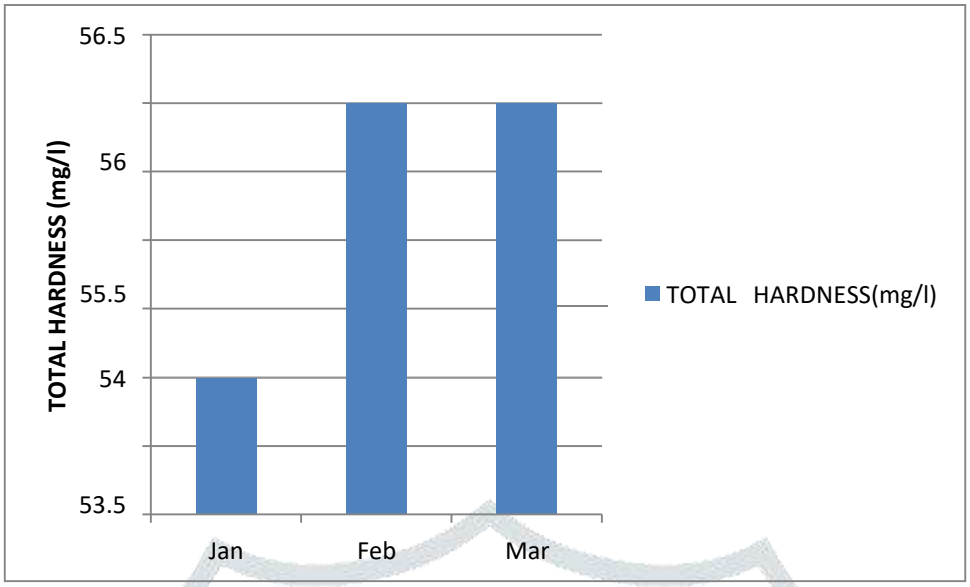

Fig 6 : Monthly variations of Total hardness in Sastha Kovil reservoir

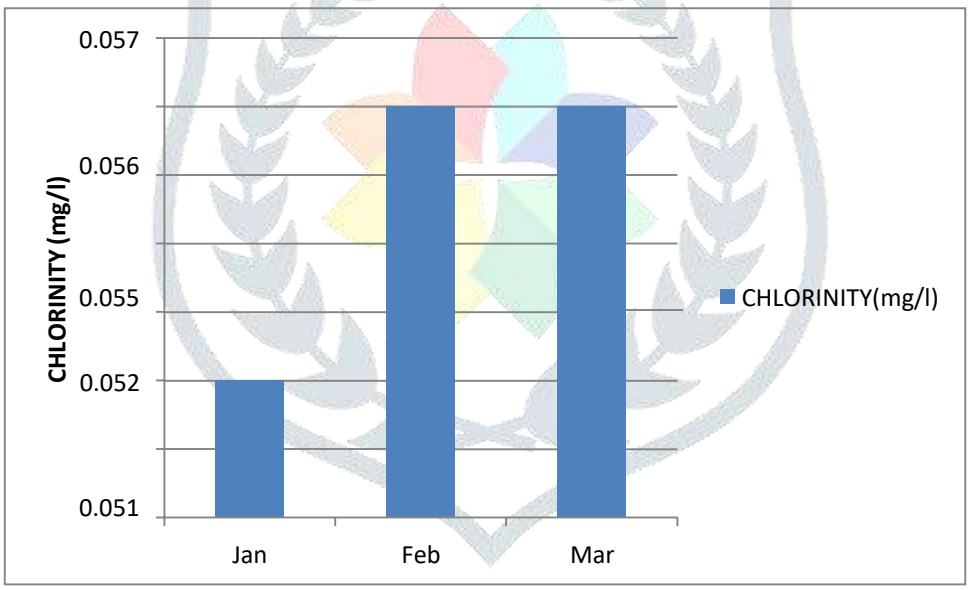

Fig 7: Monthly variations of Chlorinity in Sastha Kovil reservoir

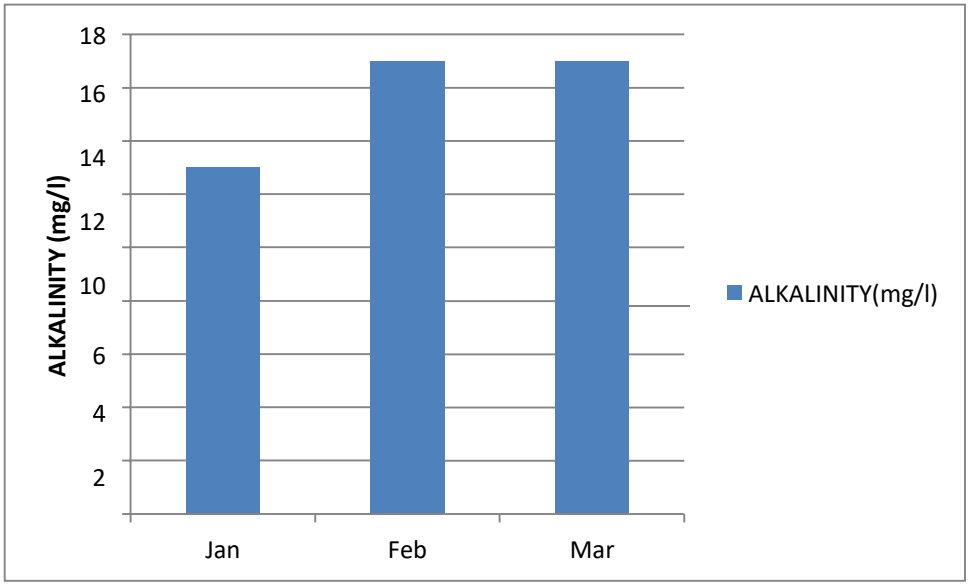

Fig 8: Monthly variations of Alkalinity in Sastha Kovil reservoir

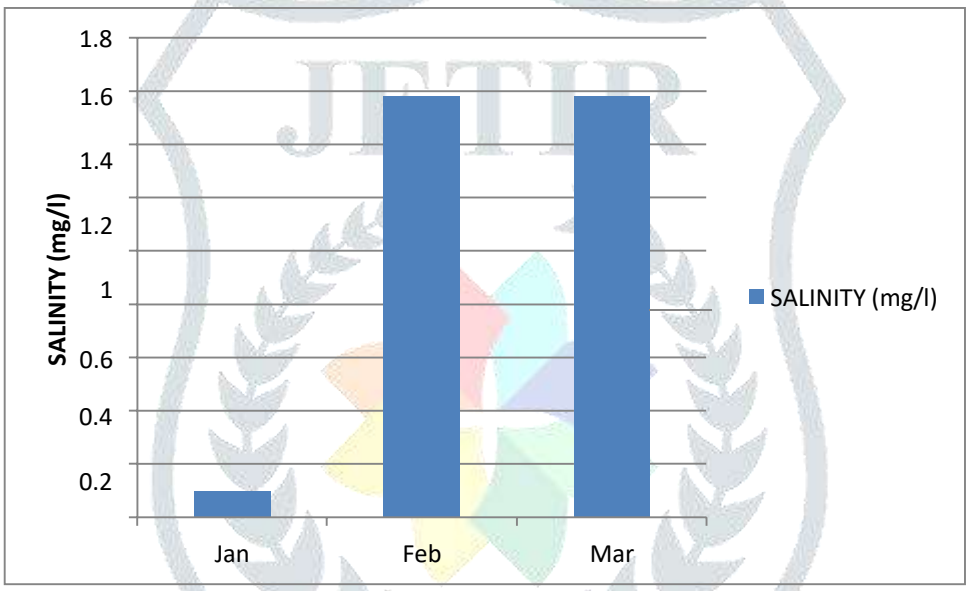

Fig 9: Monthly variations of salinity in Sastha Kovil reservoir

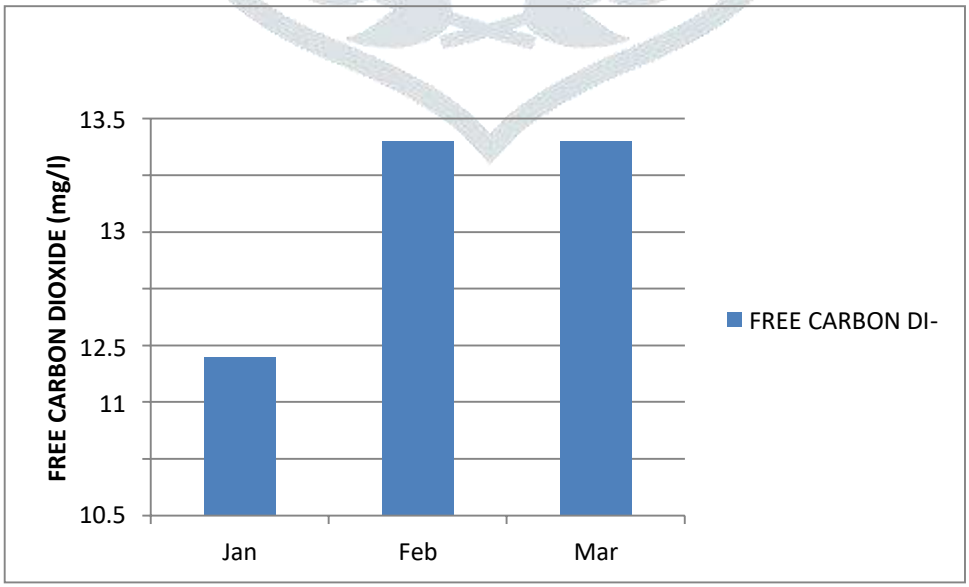

Fig 10: Monthly variations of Free carbon dioxide in Sastha Kovil reservoir

Table.2. Month wise variations of Water Quality Index in Sastha kovil reservoir

S.NO	Months	WQI
1.	January	74.28
2.	February	84.53
3.	March	83.56

Table:3. Water quality rating as per weighted arithmetic meanwater quality index method

WATER QUALITY INDEX LEVELS	STATUS OF WATER QUALITY
0.25	Excellent water quality
26-50	Good water quality
51-75	Poor water quality
76-100	Very poor water quality
>100	Unsuitable for drinking

(Source: Qureshimatva *et al.*, 2015)

Table:4.Analysis of Water Quality Index (WQI) IN Sastha kovil reservoir

Month	WATER QUALITY INDEX	WATER QUALITY RATING
January	74.28	Poor water quality
February	84.53	Very poor water quality
March	83.56	Very poor water quality
OVER ALL	**80.79**	Very poor water quality

A water quality index provides a single number that expresses overall water quality at a certain location and time based on several water quality parameters. WQI value is a measure of pollution load. WQI-100 reveals that the water is polluted and unsuitable for human consumption (Gangwar *et al.,* 2013)..According to these criteria, the quality of Sastha Kovil reservoir is very poor (Table 4), which fairly supports the growth of aquatic flora and fauna. The WQI or pollution load fluctuates in water due to several factors such as, the volume of water, density of biota, the quantity and quality of wastes, surface water runoff etc. High pollution levels change the environment of the waterbody, in which only a few species can tolerate and later flourish due to better adaptability and decreased competition from other species (Puri *et al*.,2015). Therefore, it is suggested that immediate measures should be initiated to avoid further contamination of reservoir due to anthropological activities.

Conclusion

In the present investigation, all the recorded values are within the permissible limit as mentioned by BIS standards (Table 1).According to WQI, the water in the reservoir is found to be very poor in condition. Therefore, the waterbody is under pollution based on WQI results. Hence, it needs conservation to prevent further degradation. Also there is a requisite for regular monitoring of water quality to measure variations in physico-chemical parameters of water at different sites. By implementing Bioremediation measures and by creating awareness among public, a sustainable ecosystem will be achieved.

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