Environmental Impact of COVID-19 on Water Pollution with National Lockdown in South India

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Abstract

The novel coronavirus CoV-19 affected the human life and this has lead to national lockdown of different nation. Also this has put millions of people in threat and even affected the economic background of the countries. Along with these there is a reason to celebrate. Over a month into the national-lockdown the air quality and water of various parts of countries have been decreased and also the wild life has also been improved. In this article the impact of national lock down in water pollution were discussed. India's water bodies such such river, ponds, lake , ground water etc were in poor state. Most of the river were turned into canals in various places because of these economic issues and it was difficult to maintain and treat. Apart from these it is reported that about 40 million Litre of waste water joins the water body per year in India and the pure water or normal portable water is getting reduced. All these have affected the water bodies and which can cause threat of living as well as non lining forms. Here the impact of the lockdown on this water pollution has been clearly discussed and it is observed that this lockdown has brought a decline in the pollution level and saved the environment.

Keywords: Water pollution, CoV-19, river, water bodies, lockdown, water quality, nation

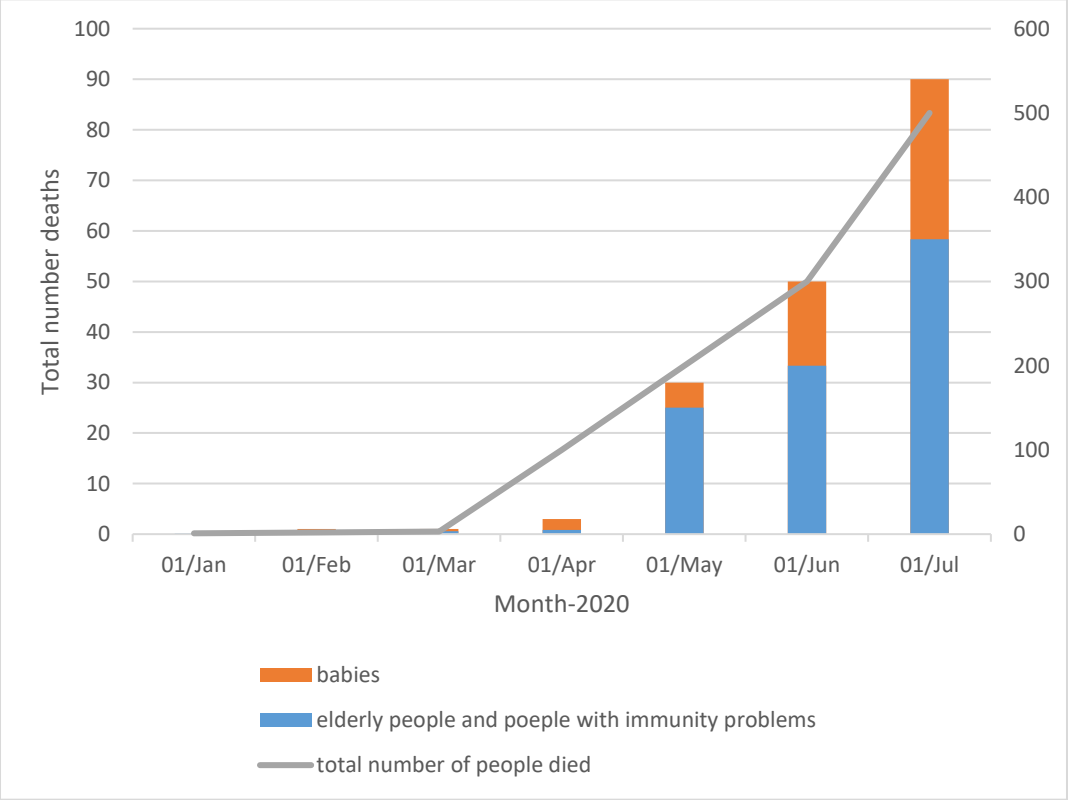
1. Introduction

Human life has come to a standstill because of novel Corona virus (COVID-19 / CoV-19) which has lead to a pandemic situation to the entire world. For the first time modern history, all kinds of industries, vehicle movements and people stopped functioning abruptly. From the literature review it was made clear that with the industrialization as well as human activities have polluted the environment to a large extend(Surico, Pet al.,2020). This has even polluted the biosphere. As a result of this pandemic the national lockdown has been announced by the government so all the anthropogenic activities has been stopped for a while. There by the environment has become more clear.

Human life is halted because most countries have stopped working on them due to the epidemic (COVID-19), which is seriously affecting the world in the first quarter of 2020. all kinds of industries, vehicle movements and people, the operation has stopped abruptly. Various literatures have long claimed that increasing industrialization and human activity over the past two decades have polluted the ambiance(Hacioglu Hoke, Sl.,2020).

The spreading in India and many other countries of the world has affected various human life but this has given a positive outcome from the part of environment and wild life.(Tafur Muñoz, M. F..,2017)Differential concepts are widely used in many fields, such as earthquakes, avalanches, and cloudbursts, in predictive and chaotic environments, such as finance, biology and modeling. The total number of deaths and the number of deaths per day increased. (Shashkina, O. .,2020). The number of cases depends up on how well the test is carried out. During the initial stages it is easy to treat the disease and the impact of virus on life can be reduced.

By mid-April 2020,this corona virus -2 has affect more than 200 countries as well as territories across the globe(Stone 2020). More than 2 million cases were reported and the highest number of death cases were reported in US, Italy and Spain. Originally originated in Wuhan, China in December 2019, coronavirus disease 2019 (COVID-19) is rapidly spreading in a person with a cough, sneezing, or respiratory drops when infected.,(Tafur Muñoz, M. F..,2017) the World Health Organization and government agencies have urged people to practice social distance, avoid public transport, and stand apart from others. Since February 2020, normal life around the world has been hit.The number people died due to this pandemic is shown in graph 1.From the report's it is clear that most of the people died are elderly and those having low immunity or unhealthy individuals(Aksoy, C. G et al.,2020).In this graph it is clear that those people who go out for work or elderly people or those unhealthy individuals get affected faster than all others.(Shashkina, O., 2020)



Graph 1:Total number of death in South India due to the effect of novel corona virus

Identifying contaminants during the lockout era is an important activity for researchers to understand the effect on the COVID-19 ecosystem of short and long term outbreaks. Satellite-based data from NASA's Aura Satellite (ESA 2020) to ESS' Sentinel-5 Satellite Tropospheric Monitoring System (TROP) and Ozone Monitoring System (OMI) indicate environmental declines (Akosi, C). 2020). G et al. On the other side, marine pollution studies, including lakes , rivers , oceans and freshwater reserves, were not performed. The world has been seriously affected for decades by rapid urbanization , industrialization and over-exploitation. During the lockout era, major industrial resources affecting marine environments, such as industrial waste disposal, crude oil , heavy metals , and plastics (Hyder et al. 2020), were either limited or entirely closed (Allison, A. 2020). Pollution levels are therefore supposed to be small. For example, it is evident the Grand Canal in Italy, where COVID-19 has crippled the whole country, and the reappearance of many aquatic species (Clifford 2020). Similarly, during the nationwide lockout time, the Ganga, India 's holy but badly polluted river, will be launched from 25th March 2020.

2. A brief description of water pollution in South India

Water contamination is an Important issue which affect India. The biggest pollutant is the untreated sewage. Other source include run off from agricultural land, un regulated small industries as well as solid wastes.

From the reports it was made clear that Karntaka has the highest number of polluted rivers in South India(Bradt, D. A et al.,2020). Here is a news report from Times of India

BENGALURU: The water you are drinking or using for your daily needs might not be as clean as you think. One can only imagine the extent of pollution with more than 9 lakh million liters of waste water entering the state rivers annually. South India has Karnataka's most polluted river-15, and river pollution continues to unabated. In Tamil Nadu there are seven, in Kerala 13, in Telangana seven, in Andhra Pradesh six in polluted riverbeds. According to the Karnataka State Pollution Control Board (KSPCB), every day 3.777 million liters of sewage are pumped into the rivers of the State. Just 1.304 million liters of that are being processed. The other 2.473 million liters of water are emitted daily (Bouffet, E.,2020). Lifelines collect 9.03.645 million liters of wastewater and industrial waste annually throughout the province. This just handles 4.75 million liters.

According to the KSPCB, only 16 percent of the state's local companies own wastewater treatment plants (STPs). Of the 219 local companies, only 36 provided STPs. The KSPCB has issued instructions to local bodies to set up STPs on the instructions of the Central Pollution Control Board. But nothing has changed

(Canlı, E..,2020).

According to officials, the main cause of pollution in the rivers is the flow of untreated sewage into them. One KSPCB official said, "The last sink is rivers and lakes for every city or town's waste. If purified sewage enters the river, it's not a problem."

There is no record at KSPCB of the number of people who have been fined or convicted of polluting rivers(Garg, V et al.,2020). KSPCB president Laxman said, "We have given instructions to local bodies and it is their responsibility to implement the regulations". Here are some examples of polluted rivers in South India.

Agnischini River is under pressure. In 2009, in this great and highly productive estuary, Karnataka State Industrial and Infrastructure Development Corporation (KSIDC) proposed to establish a multi-purpose portfolio of estuaries. This is now the final move from the Ministry of Environment's final approval-without affecting the climate, its marine organisms and traditional livelihoods. 'The NEERI in Nagpur conducted an Environmental Impact Assessment on behalf of the Industrial Organization on the proposed port. On 23 March 2015, the Pollution Control Board (PCB) held a public hearing and strongly criticized the draft Impact Assessment Report during the hearing minutes. PCB received approximately 300 written submissions (Yunus, AP and others) in 2020.

Cauvery: The Cauvery River is being constructed at a cost of Rs 5,912 crore on 66.50 TMC feet of water near the Mekkeda in Ramanagaram district. As part of the project, a 400 MW hydroelectric unit is also planned. Justice Minister T. According to B. Jayachandra, the project will help the state to utilize additional river water, otherwise the waste will go into the sea. About 4,900 hectares of forest land is to be purchased for the project. The government can implement the project only after getting permission from the Kaveri Monitoring Committee and the Central Water Commission.(Selvam, S et al.,2020). It failed to oppose the project with Tamil Nadu.After Yettinahole, Upper Bhadra it is Mekedatu. Karnataka seems to be hell bent on pushing environmentally destructive projects. This one will need thousands of hectares of forest land.

Coffer dam may have aggravated contamination in the Phalguni While officials of Karnataka State Pollution Control Board (KSPCB) and experts from College of Fisheries believe that the coffer dam built to facilitate the construction of the Malavoor vented dam across the Phalguni (Gurupura) on its downstream has created a pond-like formation(Arif, M. et al.,2020) thereby aggravating the contamination but engineers with Dakshina Kannada Zilla Panchayat dispute the suggestion.

Nevertheless, continuation of the existence of the coffer dam even after four years of the construction of the vented dam remains an undisputed fact as against the practice of removing the same from river beds immediately after completion of any construction.

The cause of recent fish kill, Gangadhara Gowda, Head, Department of Aquatic Environment Management, College of Fisheries, Mangaluru, said that the accumulated ocorinrganic waste downstream the dam was not flushed out during high tide due to more depth(Mukherjee, P et al.,2020)

.The coffer dam, built about 200 m downstream the vented dam to prevent flow of saline water during high tides, becomes visible when the water level recedes during low tides. Added to this is the water gushing out of the vented dam during floods deepening the riverbed downstream thereby creating a pond-like structure.KSPCB officials believe that the structure reduces the force of high tide water, as a result of which the accumulated organic waste, particularly that on the riverbed, remains intact(Chakraborty, S et al.,2020).

Zilla Panchayat engineers, however, sought to differ with the suggestion claiming that the coffer dam is broken in the middle thereby providing sufficient space for movement of water during high and low tides(Tobías, A.et al.,2020). “The dam is in place since about four years and the problem has occurred only this year. The contamination must be due to industrial effluent,” said an engineer.(Khursheed, Aet al.,2020).

– Low levels of oxygen in Phalguni river had resulted in the death of several fish last summer, and the National Environment Care Foundation, Mangaluru, says a graver situation has arisen even before the summer this time around.

– Very little of domestic sewage is treated and used for industrial purposes as the entire infrastructure created using Asian Development Bank funds under Karnataka Urban Development and Coastal Environment project has crumbled, Shashidhar Shetty, general secretary of the foundation said(Dhar, I et al.,2020)

– On the other hand, the Thokur stream, flowing through Mangalore Special Economic Zone and Baikampady Industrial Area, is rotting with industrial and domestic waste. Joining the Phalguni downstream the Malavoor vented dam, the stream discharges waste into the river.

– Unabated sand extraction in the Coastal Regulation Zone of these rivers has deepened the river course.

Figure 1: Low oxygen levels in Phalguni river in Mangaluru resulted in fish kill last summer. (Image Source: The Hindu)

Elevated amounts of nitrates in groundwater are a concern worldwide. Persistent exposure to high groundwater nitrate levels may have health effects on citizens using groundwater (Mandal, I., & Paul, S., 2020). Studies have therefore been conducted to research the nitrate distribution and its possible health risk assessment from the semi-arid Pedawagu area in southern Telangana (PCT), central India. However, a team of scientists was doing the analysis to determine the nitrate distribution. The semi-arid Padaagu area in central Telangana (PCT) in southern India poses a danger to their safety. Groundwater samples from thirty-five locations were obtained and analysed for nitrate and other criteria of water quality. In groundwater, the nitrate (NO3-) ranges from 17.7 to 120 mg / L, with an average of 58.74 mg / L (Kumar, M.L., 2020). 57 per cent of the samples meet the Indian drinking water quality maximum permissible limit. 40% of groundwater samples have a good water quality index (DWQI), while 60% of groundwater has bad water requirements (Adimal, n. 2020).

Groundwater is a major source of drinking water in South India's Nirmal Region, and is at risk to human health from contamination with fluoride and nitrate. The Hazard Quotient (HQ) and Total Hazard Index (THI) were determined using the most appropriate methodology recommended by the United States Environmental Protection Agency (USEPA), to measure the risk of cancer in men , women and children. Results of the study showed that 26% and 20.59% of groundwater samples had high concentrations of nitrate and fluoride exceeding the maximum permitted limits set by the Indian Standards Bureau (45 mg / L and 1.5 mg / L , respectively). Hence excessive consumption of fluoride and nitrate water in the study area may be a significant health source. Total cancer-free health risks ranged from 2.95E to 01 to

4.07E+00 for men , women and children, from 3.49E to 01 to 4.80E+00, and from 3.99E to 01 to 5.50E/00 (Zhang et al., 2020). Furthermore, 67.65 percent of all groundwater samples were collected, 79.41 percent and 82.35 percent, which is an appropriate overall health index (THI = 1) for men , women and children (Selvam, S. Pate et al . , 2020). Overcoming limits. Health risk assessment therefore indicates that children are at higher health risk than men and women.

Groundwater is India's only source of water in the Siddipet-Wagu (SDV) area and its quality is significant because it is the primary determinant of groundwater suitability for use in drinking and irrigation. Samples were obtained from groundwater to determine the suitability of natural groundwater. Irrigation is meant to determine the impacts of groundwater contamination on human health. Land resources and urbanisation severely affect the groundwater quality of the SDV region. From the Fluoride and Nitrate production. Results showed the highest concentrations of nitrate in the sample region were 348 mg / L and 3.7 mg / L of fluoride. The big issues impacting healthy drinking water in the SDV region are nitrate and fluoride. The most important hydrochemical facies indicate that alkalis are more alkaline than earth, and strong acids in groundwater outperform weak acids. The tests of sodium absorption ratio (SAR), sodium percentage (% Na), magnesium hazard ratio (MHR), kelly ratio (KR) and residual sodium carbonate (RSC) indicate that most groundwater samples are suitable for irrigation purposes. This approach is used to assess cancer risk caused by exposure to UCPs, nitrate, and forklide (Mukherjee, i. & Singh, UK, 2020). Results suggest that infants in the study area are more likely to be exposed to nitrate and fluoride through drinking water. And groundwater management strategies need to be implemented to prevent groundwater contamination.

3.Environmental Impact of Covid-19 in Water Bodies

The pandemic has lead to a major loss for the country and this has even resulted in the shut down of industrial activities, tourism as well as transport facilities. In times of crisis, limited human contact with nature is a boon to nature and the environment. Various research's shows that the lockdown has lead to the improvement of quality of water, air as well as the overall environment (Kao, B.,2020). India has always been a large population pollution center. As a result it was clear that the water quality began to give positive signals for recovery. The central and state governments of India have taken several mitigation and suppression measures to reduce the population of COVID-19's community transmission, including a strictly enforced national lockdown, which was initially announced for 3 weeks. And then it was extended.

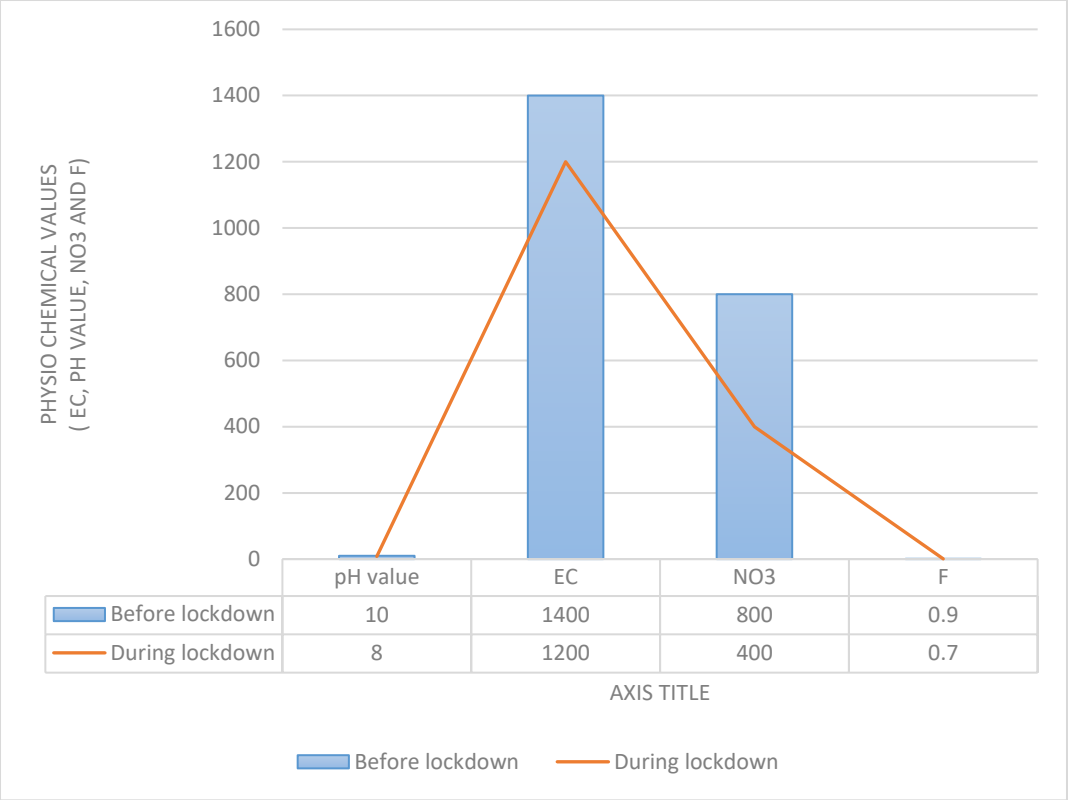
Beaches are one of the natural capital assets found along the coast (Zambrano-Monserrat et al., 2018). They provide services (land, sand, recreation and tourism) that are crucial to the survival of coastal communities and have intrinsic values that must be protected from hyperactivity (Lucrezi et al., 2016). However, many beaches around the world are facing pollution problems due to irresponsible use by people (Partlow et al., 2015).

The lack of tourists and the new coronavirus pandemic have resulted in a significant shift in the appearance of many beaches around the world as a result of social distances. For example, beaches such as Acapulco (Mexico), Barcelona (Spain) or Salinas (Ecuador) are now clear and crystal clear(Rani, R.,2020).

Under the lockdown, areas causing water pollution, such as industries, power plants, construction activities, and transportation, have been stopped. Educational institutions and hospitality services have also been postponed. Under these conditions, water quality improvement in the country's river system has been observed. One study described changes in chemical and biological water quality parameters based on twenty-two groundwater samples from Tuticorin (twenty-two February and 11 February 2020) in the coastal industrial city of South India and before the lockdown (19 and 20 April 2020). Period(Bates, A. E et al.,2020). Total dissolved solids (TDS) and electrical conductivity (EC), pH and heavy metals were analyzed. Chemical parameters.), Cadmium (cd), lead (pb), arsenic (ass), and selenium (se), and bacterial parameters total coliform, fecal coliform, e. Coli and rectal streptococci. In metal-based industries, the release of less or less waste from seafood has resulted in a significant reduction in metals C (42%), 51 (51%), Fe (60%) and Pb (50%).(Atalan, A.,2020). Similarly, we observed that there were no significant changes in domestic wastewater production during the lockout. No changes were observed in coli and rectal streptococci. Multivariate analysis clarified this, and principal component analysis helped to identify the sources controlling the water characteristics of the lockdown compared to the pre-lockdown period. (Rani, R.,2020). Groundwater is certainly in active contact with surface water and can therefore rapidly regenerate after the capture of anthropogenic activities.

In case of Tamil Nadu the number of industries were growing and the environmental pollution were increasing with that. Various protest to save the nature were going on from 2018. The major industrial cities in Tamil Nadu include Coimbatore, Chennai, Erode and Tuticorin. A multi sample portable analyzer were used to determine all the physio chemical parameters in water bodies and compare with the previous data.

(Fehintola, J. O., & Fehintola, R. O. .,2020). NO 3 concentrations were assessed on a UV-invisible spectrophotometer (Systronic) and analyzed using an ion ion-select electrode. The variation in physio chemical parameters of Tuticorin water body before and after lockdown is shown in Graph 2.



Graph 2: The variation physio chemical parameters variation during and before lockdown in Tuticorin is shown .

Electrical Conductivity (EC)- µs/cm, Flouride (F)- mg/L , Nitric Oxide (NO3)

The purity of water in Tuticorin South India were improved with the national lockdown. This was clearly described in the the graph 2. The concentration of Nitrogen Oxides as well as CO level also reduced as well as the deposits of heavy metals were reduced. Usually the Tuticorin were contaminated with waste water which lead to the development of micro organisms. The harmful coliform bacteria were present but with this lockdown the amount of coli forms present in the water body reduced(Somani, M et al.,2020). All those measures taken to reduce the human activities as well as shut down of industries is the main reason to reduce the pollution. The government has taken several measures to check and analyze the water quality in different areas including Tuticorin. This lockdown has made us understand that it is those anthropogenic factors which leads to the pollution. (Li, X et al.,,2020). The recycling of waste as well as pollution caused by pathogens and heavy metals can affect the human health as well as environment. In this case the water quality of ground water were also increased and this continuation of lockdown can still decrease the pollutants present . The ground water quality is determined by mainly analyzing sources like agriculture, chemical industry, thermal power plants and municipal sewage. This lockdown has led the world into a suprising factor and various researches are going on in order to find the after effect.

4.Case Study: Impact on Lockdown in Water Pollution in Specific River in South India

The textile and tannery processing industry, which is accused of releasing waste into these waters, has been shut down due to a lockdown. In Chennai, when you finally leave home, there is an empty garbage barrier on Koum near the Napier Bridge; Pure Perumbakkam Lake; The duck happily jumps on the lush green marshland of Thirumazai Satellite Township. Clearly, our reservoirs are their main pollutant - relieving us. The epidemic has clearly benefited our natural resources, birds, animals and plant life. The endangered Ganges river dolphin appeared to flow into the pollution-free river in Meerut; Water quality has improved in Yamuna. Here we will look at some specific rivers of South India:

Case of River Pampa (Kerala): The quality tests carried out by the Kerala State Pollution Control Board (PCB) have found the Pampa waters with far less coliform bacteria, compared to the same period the previous season.PCB district environmental engineer Alexander George said the coliform count at Pampa-Triveni was 600 per 100 ml of water on the 10th day of the season.his was against 18,000 for every 100 ml on the same day the previous pilgrim season(Loucif, K.et al.,2020)

Though open defecation was prevalent on the banks of the Pampa owing to acute shortage of facilities at the flood-ravaged Pampa Manalpuram, it had not yet affected the water quality of the river.The deluge-damaged sewage treatment plant (STP) at Cheriyanavattom too started functioning a few days ago(Alcaine, A. A et al, 2020).The Njunangar stream, which originates in the upper reaches of Sabarimala, too was comparatively pollution-free now as the modern STP at the Sannidhanam was functioning satisfactorily.ood waste was a major problem at the Sannidhanam, Pampa, and Nilackal which reduced as a result of lockdown.

Water quality of Kallayi river, Kerala: Coronavirus lockdown has done wonders as there is dramatic improvement in the water quality of Kallayi River in Kerala's Kozhikode. The river is flowing clean due to less pollution and footfall of human beings. The river was free from waste materials and so that the water bodies were clean and doesnot produce any harmful substances(Somani, M.,et al., 2020). The water animals survived much better. After long years the water bodies were perfectly clean from all those human activities which were the main reason behind the pollution.

Water quality of rivers in Bangaluru:: Unexpected high-intensity pre-monsoon showers and the lockdown have turned out to be a perfect mixture for an increase in both the quantity and quality of water in the Cauvery basin. The Cauvery, which rises at Talacauvery in Kodagu district, has many tributaries including Harangi, Hemavati, Kabini, Bhavani and Lakshmana Tirtha. It flows through three States — Karnataka, Tamil Nadu and Kerala — before emptying into the Bay of Bengal.

According to the Karnataka State Natural Disaster Management Centre, the normal average rainfall during the pre-monsoon period (from March 1) should have been 76 mm, but the actual rainfall is 83 mm, which is 8% more than the normal(

Vasistha, P., & Ganguly, R. 2020). There was good rainfall, especially in Mandya and Mysuru region. Due to the lockdown, industrial effluents and other factors causing water pollution, have come down.Earlier, industrial effluents, untreated sewage water especially from hotels, resorts and homestays would enter the river basin, polluting it. Due to the lockdown, all industries and the tourism sector were shut and the chances of chemicals entering the river were less. Water is now better, tastes better.

Water Quality of Krishna river: Due to this lockdown the Krishna water looks more clear and free from contaminants. The pollutants were released into the river from the factories of Karnataka as well as Maharashtra without treating the toxic substances. The river was badly affected from past 40 years. This river is the 4th largest water flow as this can meet most of the demands and can be used for drinking purposes. But with the lockdown the purity of water is regained(Kumar, A. U., & Jayakumar, K. V. 2020).The Sangli city is located at southern part of Maharashtra state in India. The biggest city of Sangli district is situated at left bank of river Krishna. River water is becoming a helpful for the growth of city population, industrialization and agriculture around the city. The haphazard growth in population and industrialization generate huge amount of waste and pollutant which discharge into the river Krishna. Many cities of the world become a major point source of pollutants though there is government act of pollution of controls. The population of Sangli-Miraj-Kupwad municipal corporation is more than 5.3 lakhs in 2020. Nearly 55 MLD of water is consumed by the people of Sangli from the Krishna River. Approximately 48 MLD of waste water is generated from Sangli City. Thus by lockdown the water become pure and can be used by human beings for various purposes.

5.**Conclusion**

Even though Lockdown has affected the life of many these national lockdown brought a positive effect on the environmental condition. From these article it is clear that the various water bodies in South India has been turned into pollution free. Most of the various were in a situation that this was difficult to treated or that must cost high. The amount of portable or pure water were decreased to about 37 percent of total water reservoirs that most of them were affected with heavy metals, toxic substances , domestic wastes and so on(Sahoo, M. M., & Swain, J. B 2020). Here the lockdown has reduced and an amazing positive outcome is obtained to water bodies and wildlife is free. This clearly points out that the anthropogenic factors are the main reason behind pollution(Gurijala, A et al., 2020). Here some of the specific water bodies were pointed and studied the effect after and before the lockdown. Thus from the

reports it is made clear that the water bodies become non polluted. So the CoV-19 has been a investment for a clean environment.

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