



SEASONAL WATER POLLUTION AND ITS HEALTH IMPACT OBSERVED IN PAMPA RIVER

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ABSTRACT

River Pampa is the Holy River of the Hindus in southern India. In the northwest foothills of the Pampa Plateau, Sabarimala is a popular forest shrine. It has become one of the most popular pilgrim centres and the Shrine is being visited by millions of pilgrims in November and January. A survey was conducted among 100 people living in the banks of river Pampa. The survey contains questions regarding their utility of the pampa river, the amount of water collected, and the pollution of the river. Comparing the survey results and Kerala State Pollution Control Board it is clear that the river is most polluted in the pre-monsoon season and during the winter season. The Sabarimala pilgrimage and conventions on the sand beds are the major contributory factors of pollution during this time. The Government of Kerala and Central Government has already launched various missions for the protection of river Pampa.

1. INTRODUCTION

River Pampa – A brief description

44 rivers, various reservoirs and lakes, and backwaters are blessed in the state of Kerala. Unfortunately, certain aquatic structures that support the state's life and its greenery are on the verge of serious decline as natural resources are exploited over active channels and inundated areas. The rivers of Kerala have been polluted increasingly by industrial and household waste and pesticides and fertilizers. Examples of pollution due to industrial effluents are the Periyar and Chaliyar rivers. The main water quality issue linked to the Kerala river is bacteriological contamination (State of Environment Report 2005). The holy Kerala River is Pampa, otherwise known as southern Ganga. It is the third greatest river in Kerala, with a surface area of 176 km (2235km.). It is a lifeline of central Kerala via Idukki, Pathanamthitta, and Alleppey. Because of its historical association with Sabarimala Temples and Lord Ayyappa's epic, River Pampa is the Holy River of the Hindus in southern India. In the northwest

foothills of the Pampa Plateau, Sabarimala is a popular forest shrine. It has become one of the most popular pilgrim centers and the Shrine is being visited by millions of pilgrims in November and January, and every first month of Malayalam. The largest Christian Congregation in Asia, the Maramon Conference, takes place every year on the sand beds of this river. The river is also notorious for poor water quality in downstream municipalities and parts of Kuttanadu. Untreated hospitals, municipal waste, and agricultural waste disposal are the subject of river bed conventions which have caused unspeakable harm to the river and have serious effects on the quality of life of the people relying upon the river. The indiscriminate mining of river sand caused the aquatic system to deteriorate too. A broad variety of pumping plants operate on the pampas and a contaminated water supply is not accessible for proper and efficient treatment to nearby communities.

**Data from Central Pollution Control Board (CPCB)**

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organised)	B	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	<ul style="list-style-type: none"> pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	<ul style="list-style-type: none"> pH between 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

Classification of Water uses by Central Pollution Control Board (CPCB)

Each water use has a specific quality need. Therefore, to set the standard for the desired quality of a water body, it is essential to identify the uses of water in that water body. A designated best use definition was developed in India by the Central Pollution Control Board (CPCB). Accordingly, the use that requires the highest quality is designated as best use by many uses of water of a specific body. There have been five designated best uses. This classification allows managers and planners to define water quality goals and develop adequate water repair plans for different water bodies.

2. LITERATURE REVIEW**Environmental Resource Information on Pampa River Basin**

Various studies have been conducted in various stretches of river Pampa during the pre-monsoon season and winter season. The mean water temperature in the different stretches of the river varied between 21.7 to 33.0 °C. The dissolved oxygen levels depicted low to moderately high values ranging from 4.5 to 7.8 mg/l in all the stretches except in the estuarine stretch where the value fell to

2.2 mg/l during the pre-monsoon, and the carbon dioxide value increased to 12.4 mg/l, which may be attributed to the discharge of municipal waste into this region. The principal change noticed was the lowering of mean alkalinity and total dissolved solid level to 16.5 mg/l and 29.7 mg/l respectively. The dissolved nutrient concentration was highly influenced by the monsoon discharge (Biju Vikram and Jha, 2003). Owing to high domestic and sewage release and agricultural flow in the system, the nitrate and phosphate content showed much higher in the lower and estuarine stretches (Nitrate-1.32 and 0.07 mg/l, and Phosphate-0.04 and 0.01 mg/l). The lower (40 mg/l) and estuarine stations (35 mg/l) show the high COD levels reflect the high organic load that causes extreme water body pollution (2003 Biju Vikram and Jha). In comparison with the Indian peninsular rivers, several studies find that the levels of bicarbonates are poor in Kerala Rivers. In the Pampa, Anabeno, Ankistrodesmus, Chlorella, Navicula, tintinnids, Pleurosigma and Microcystis were major planktonic species collected in the river from different parts of the river. In most areas, algal biomass and benthic biomass were generally low. In 2003-04, 69 species of indigenous fishes and 10 species of exotic/non-indigenous fisheries were



involved in river fisheries(Biju Vikram and Jha (2003)). 57 species recorded in this study assisted commercial fisheries. According to the grading of IUCN, 30 species of which 5 *Labeo dussumieri*, *Puntius*, *Denosni*, *Horabagrus brachysoma*, *Horabagrus Audree* and *Hypselobarbus curmuca* belonged to the endangered category can be treated as threatened. There were no two species *clarius dussumieri* and *Channa punctatus*. In 1999-2003, the annual catch in the Pampa River dropped by 34%. Exotic fish occupied the upper stretch and substituted for endemical fish such as *Tor khudree* and *Hypselobarbus Curcuma*. The introduction by the Kerala Forest Development Corporation of these fish to the upper reservoirs was responsible for an increase in the capture of exotic fish in the river system. Recent research at the Cochin University of

Science and Technology has shown that 174 species of fish have been collected and described in the Kerala rivers and streams, in 13 orders, 29 families, and 65 genera. The Pampa species described in this study by their status were: *Chandanama* (low-risk), *Channa marulius* (violin), *Channa micropellets* (critical), *Gara Mullya* (low risk) *Labeo dussumieri* (endangered), *Labeo rohitis* (low risk), *Mastacembeles armatus*(low risk) *Nandus nandus* (low risk) (low risk). The water quality of the Pampa River was researched by Harikumar et.al and found that contamination was due to open defeat, bath and overflow of excreta-laden earthen-tanks. Total coliforms of 4000 to 78000 MPN per100 ml were measured. The following table shows the water quality parameters of river pampa over various years.

Water Quality parameters of river Pamp

Parameter	Year	Pampa	Vadaserikara	Edathua
pH	2007	6.345	6.19	6.1
	2008	6.5	6.59	6.3
	2009	7.02	6.69	6.8
	2010	6.91	6.9	6.7
	2011	6.9	6.41	6.4
BOD	2007	7.38	0.80	1.26
	2008	3.50	1.07	0.99
	2009	7.50	0.95	0.85
	2010	8.30	0.59	1.07
	2011	15.0	0.95	0.64
Faceal coliform	2007	4704	779	763
	2008	1982	992	910
	2009	16021	230	260
	2010	9849	299	271
	2011	6950	307	412
Total coliform	2007	6300	2067	1950
	2008	3632	2510	1657
	2009	17335	547	603
	2010	14678	759	735
	2011	14729	498	666

KSPCB Pampa river monitoring various years

3. RESEARCH METHODOLOGIES.

A survey was conducted among the people living in kozhencherry which is located on the banks of the river pampa. It is one of the famous village in

the Pathanamthitta district in Kerala the largest Christian Congregation in Asia, the Maramon Conference, takes place every year in this village. The people were mostly between the age of 20 – 40

years. Questions regarding their utility of the pampa river, the amount of water collected, and the pollution of the river were asked to the people. The questions were as follows.

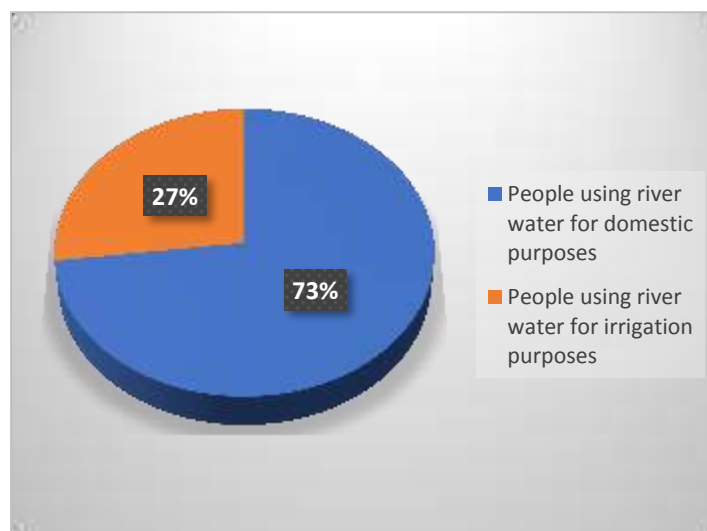
1. For what purpose you are collecting water from the river pampa?
2. What is the amount of water collected per day?
3. In which season the river is polluted the most.?
4. What are the decontamination methods you use if you consume the river water?
5. Any previous health hazards resulted due to consumption of river water?

4. RESEARCH ANALYSIS

Out of the survey conducted among 100 people, 73% of the people marked that they use the river water for domestic purposes and the rest said that they will use the water for agricultural purposes. Drinking, Bathing, Washing of clothes, Washing of cooking utensils, and toilet usage are the major domestic best uses of the river water by the respondents in the study area. Out of the 73% people who marked domestic purpose, 85 percent each of the total users used the river water for bathing and washing of clothes. 37 percent of the respondents used the river water for drinking purposes during the

summer seasons and 31 percent used the water for toilet purposes. Irrigation and washing of animals are the major agricultural uses of the water by the nearby communities. It is revealed that 27 percent of the respondents surveyed use the river for such a purpose.

Most of the people who took part in the survey said that they collect about 18 liters of river water per day for their needs. Out of 100 people, about 60% the people agreed that river water in their area is polluted and the rest disagreed with the question. About 83% of the people reported that their river is most polluted during the pre-monsoon season and winter. The majority of the people (65%) who took the survey reported that they use the traditional disinfection method known as boiling for decontamination before consumption, the rest of them (35%) reported chlorination as their decontamination method. The present study covered a total population of 100 individuals. 76 cases of water-borne diseases were reported during the last four years in the study area. Skin diseases in the form of itching etc were largely reported, infectious hepatitis/Jaundice, Diarrhea, Schistosomiasis in the form of continuous cold and other related problems, and typhoid are mainly reported during the past years.



5. CONCLUSION AND RECOMMENDATION

A comprehensive study was conducted by the State Pollution Control Board (KSPCB) to assess the water quality of the Pampa basal area. The study showed that water is used on all parts of the river, including bathing, the use of water for washing clothing, utensils, and even cooking and drinking, by rural populations and even the poorer sections of the

urban society. Based on this, the best use is found and the river classification is accordingly rendered for a different stretch of the river. For various uses, it gives minimum desirable standards of water quality. Comparing the standards. Assessing the quality of the pampa river we can classify the major portions utilizing the norms by the Central Pollution Control Board as follows.



Desired and Existing Water Quality

River Stretch	Quality		Critical Parameters
	Desired	Existing	
The upper reaches of the Pampa and its tributaries above Chenganoor	A	C, D	Total Coliform BOD, DO
The stretches below Chenganoor up to point of confluence with Vembanad lake	C	C	The quality of water conforms to the desired classification hence no critical parameters.

From the survey and literature review, we can conclude that the pollution rates were seen higher in the pampa river during pre-monsoon season and winter. The seasonal variation analysis reveals that large variations in water quality occurred during the winter (January –February) and post-monsoon seasons (October – December) of the year. The reason behind this type of large variation is the increase in a load of pollutants during these months. The Sabarimala pilgrimage excessive usage of water by human settlement.

Kerala Government had already launched the 'Suchitwa Mission' in the area of Sabarimala in order to protect and safeguard the river Pampa. The mission built Awareness among the Ayyappa devotees on the need to keep Pampa and Sabarimala neat and clean and not to throw any waste into the Pampa river. Also, Ministry of Environment, Forest, and Climate Change launched the Pampa Action Plan for abatement of pollution of river Pampa for an amount of Rs. 18.45 crore under the National River Conservation Plan (NRCP). The project includes a sewerage system & sewage treatment plants, bathing ghats, community toilets, public participation, etc. at Pampa and Sabarimala.

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and conventions on the sand beds are the major contributory factors of pollution during this time. The low discharge of water in these months aggravated the problem of pollution of the river. BOD and total coliform counts are increased at a faster rate during pilgrim season over the years. The water quality in the upper reaches of the river at Sabarimala is affected mainly during the festival seasons. The water quality below Perinad up to Chenganoor was also seen affected mainly due to

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