

**BEFORE THE NATIONAL GREEN TRIBUNAL (SOUTHERN ZONE)  
CHENNAI**

**O.A.No. 1 OF 2021**

Tribunal on its own motion-SUO MOTU  
Based on the News item in The Mathrubhumi  
Newspaper, Edition dated: 03.10.2020, "30  
Lakh Cubic Metre of Sand can be taken from  
Bharathapuzha

...Applicant

Vs

Union of India and Others

...Respondents

**Response submitted by the Principal Secretary, Revenue &  
DM/5<sup>th</sup> respondent**

It is submitted that the above case has been Suo Motu registered by this Hon'ble Tribunal on the basis of the newspaper report published in Mathrubhumi Newspaper, Edition, dated 03.10.2020.

2. It is submitted that the matter published in the above newspaper would show that in the guise of desilting without adhering to the environmental laws, riverbed mining is attempted to be done without any scientific method and the environmentalist in the area raised apprehension that if such an unscientific method of mining is allowed to continue in river basins, it is likely to affect the riverine ecosystem and also affect the ground water recharge level.

3. It is submitted that considering the nature of allegations made and also issue involved in this matter and in order to ascertain the genuineness of the allegations made in the newspaper report, this Hon'ble Tribunal appointed a Joint Committee to

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ascertain the manner in which the river bed sand mining is being done in the State of Kerala and whether they are complying with the Sand Mining Policy of the Central Government and also complying with all environmental laws, etc. and the committee was directed to submit the report to this Tribunal on or before 16.03.2021.

4. Accordingly, the response of the Principal Secretary, Revenue & DM/5<sup>th</sup> respondent is filing his response, for compliance before this Hon'ble Tribunal in the above Original Application.

To that effect this memo is filed and the same may be recorded.



E.K. Kumaresan  
Standing counsel for Kerala(SZ)  
Counsel for Respondent No. R5

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**BEFORE THE NATIONAL  
GREEN TRIBUNAL  
(SOUTHERN ZONE) CHENNAI**

**O.A.No. 1 OF 2021**

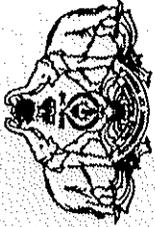
Tribunal on its own motion-SUO  
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Vs

Union of India and Others  
...Respondents

**Response submitted by the  
Principal Secretary, Revenue  
& DM/5<sup>th</sup> respondent**

**E.K.Kumaresan**  
Standing counsel for Kerala(SZ)  
Counsel for Respondent No.\_R5

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**E-MAIL/ SPEED POST**  
**URGENT**

നമ്പർ ..... W4- OA. 1/2021

കേരളം അഡ്വക്കേറ്റ് ജനറലിന്റെ കാര്യാലയം,  
എറണാകുളം, ടെലിഫോൺ-882 031

പ്രേഷിതൻ

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അഡ്വക്കേറ്റ് ജനറൽ  
കേരളം

E-mail : [advocategeneral@kerala@gmail.com](mailto:advocategeneral@kerala@gmail.com)  
19.03.2021

To

Adv. E.K. Kumaresan,  
Standing Counsel, National Green Tribunal, Chennai,  
M/S EKK Legal No. 6, Indian Chamber (SICCI),  
Annex Building, Ground Floor, Esplanad, Chennai – 600108.

Sir,

Sub:- OA.1/2021 Suomoto case registered by Hon'ble National Green Tribunal,  
South Zone on the basis of Newspaper report dated 03.10.2020 " 30 lakh  
cubic metre of sand can be taken from Bharathapuzha" – reg.

Ref:- Govt. Letter No. DMAI/19/2021/DMD dated 16.03.2021.

.....

Kind attention is invited to the reference cited. I am directed to forward herewith  
a copy of Report furnished by the Principal Secretary to Government, Disaster  
Management (A) Department, duly approved by Hon'ble Advocate General for further  
necessary action.

Yours faithfully,  
Sd/-  
PREETHA RANI. S  
Deputy Secretary,  
For Advocate General.

Encl:- As above

Approved for issue,

Ms.19.03.21

*M. King*  
Section Officer

*M. King*  
19/3/21

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File No.DMA1/19/2021-DMD

URGENT/TIME LIMIT



GOVERNMENT OF KERALA



No.DMA1/19/2021-DMD  
Disaster Management (A) Department  
16/03/2021, Thiruvananthapuram

From  
Principal Secretary to Government  
To  
Advocate General,  
Kerala

Sir,

Sub. DMD-Judgment dated 06.01.2021 in O.A.No.1/2021 (SZ), a Suo Motu case registered by Hon'ble NGT South Zone on the basis of Newspaper report dated 3. 10.2020 "30 lakh cubic metre of sand can be taken from Bharathapuzha"-Response submitted-reg  
Ref: 1) Judgment dated 06.01.2021 in O.A.No.1/2021 (SZ), a Suo Motu case registered by Hon'ble NGT South Zone  
2) Lr.No.84/AJ/2020/SEIAA dated 13.01.2021 from SEIAA  
3) Lr.No. LR KI-5370/21 dated 14.03.2021 from Joint Commissioner, Land Revenue

Kind attention is invited to the reference cited. As per the Order of NGT referred above, each respondent was instructed to furnish individual responses to the Tribunal by 16.03.2021. The response of Principal Secretary, Revenue & DM (5th respondent) is enclosed herewith for submitting to the Hon'ble NGT today itself.

Yours Faithfully,

SAJUS  
ADDITIONAL SECRETARY  
For Principal Secretary to Government

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File No. DMA1/19/2021-DMD

URGENT/TIME LIMIT



GOVERNMENT OF KERALA



No. DMA1/19/2021-DMD

Disaster Management (A) Department  
16/03/2021, Thiruvananthapuram

From  
Principal Secretary to Government  
To  
Advocate General,  
Kerala

Sir,

Sub: DMD-Judgment dated 06.01.2021 in O.A.No.1/2021 (SZ), a suo Motu case registered by Hon'ble NGT South Zone on the basis of Newspaper report dated 3. 10.2020 " 30 lakh cubic metre of sand can be taken from Bharathapuzha" -Response submitted-reg

Ref: 1) Judgment dated 06.01.2021 in O.A.No.1/2021 (SZ), a suo Motu case registered by Hon'ble NGT South Zone  
2) Lr No 84/AI/2020/SEJAA dated 13.01.2021 from SEJAA  
3) Lr.No. LR KI-5370/21 dated 14.03.2021 from Joint Commissioner, Land Revenue

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Yours Faithfully,

SAMU.S  
ADDITIONAL SECRETARY  
For Principal Secretary to Government

Original Application No. 01 of 2021 (SZ) before the Hon'ble National Green Tribunal, Southern Zone, Chennai: Interim Order Dated 6.1.2021

Response of the 5<sup>th</sup> Respondent, The Principal Secretary to Govt of Kerala, Department of Revenue and Disaster Management, Govt. Secretariat, Thiruvananthapuram

The report in Mathrubhumi newspaper dated 3<sup>rd</sup> Oct, 2020 that "30 lakh cubic meters of sand can be taken from Bharathapuzha" (in vernacular) pertains to only some findings of sand audit conducted in certain stretches of Bharathapuzha River. (*The details of sand audit of Bharathapuzha River are annexed.*) Government have approved the sand audit report in three stretches of the said river. The Government have also directed the District Collectors of Thrissur and Palakkad to take all necessary steps to strictly comply with all instructions pertaining to sand mining so that 'no unauthorized mining of sand or environmental degradation is allowed to happen'. River Sand Mining cannot commence without Environmental Clearance from the competent authority. District Survey Reports (DSRs) are necessary for seeking EC. The Hon'ble National Green Tribunal vide its order dated 14.10.2020 instructed that the DSR shall be prepared through consultants accredited by the National Accreditation Board of Education and Training/Quality Control Council of India in terms of the O.M of MoEFCC dated 16.03.2010. Hence, DSRs will be prepared accordingly in the State. Only on obtaining ECs based on DSRs, river sand mining will be resorted to in the State. All environmental and sustainability guidelines issued by MoEFCC with regard to river sand mining will be complied by the State in the event of sand mining. As of now, there is no river sand mining approved in the State. The District Collectors have been directed to comply with all statutory requirements before river sand mining can be

permitted. Hence, there is no violation of norms pertaining to river sand mining in the State as apprehended / made out in the said newspaper report.

The detailed para-wise responses are as given below.

**NGT:** *“The manner in which the River bed sand mining is being done in the State of Kerala and whether they are complying with the Sand Mining Policy of the Central Government and also complying with all the environmental laws including obtaining of Environmental Clearance (EC) as required under EIA Notification 2006, as amended in 2016, in view of the directions issued by Hon’ble Apex Court in Deepak Kumar’s case”*

**Response:** River sand mining in Kerala is regulated through the provisions of the Kerala Protection of River Banks and Regulation of Removal of Sand Act 2001(amended in 2013) and Rules 2002. Hon’ble Supreme Court’s judgment in Deepak Kumar Vs State of Haryana in 2012 and the provisions of EIA Notification 2006 and amended notification 2016 are strictly followed in the State. Guidelines were also issued by the State Government for obtaining environmental clearance for river sand mining as per circular No. P3/248/18/RD dated 15.11.2018 in the context of the EIA notification 2006 and sustainable sand mining management guidelines of MoEFCC-2016. Sand mining is controlled, monitored and carried out solely by the Government. No portion of river in the State is given on lease for sand mining by private persons.

River bed sand mining from rivers is not being done in the State of Kerala since 2016 for want of Environmental Clearance.

Sand mining was done till 2015 based on the sand audit reports prepared based on the Kerala Protection of River Banks and Regulation of Removal of Sand Act 2001(amended in 2013) and subsequent Environmental Clearance (EC) from SEIAA (EC No.571/SEIAA/K1/4230/2014 Dated. 20.04.2015 &17.12.2015). Whenever sand mining is resumed in the State after getting environmental clearance (EC), the Enforcement & Monitoring Guidelines for

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Sand Mining (EMGSM) issued by MoEFCC in January 2020 will be strictly followed along with the State Act 2001.

**NGT: “Whether the District Survey Reports are being prepared before conducting the mining and before according sanction for mining”**

**Response:** District Survey Report for river sand mining has not been prepared in the State so far. However, sand audit reports of 26 major rivers and three tributaries were prepared in the State by Revenue Department following the provisions of Kerala Protection of River Banks and Regulation of Removal of Sand Act 2001 (amended in 2013), and Rules 2002. Para 4.1.1b of the Enforcement & Monitoring Guidelines for Sand Mining 2020 of MoEFCC (EMGSM-2020) makes a mention that the sand auditing of Kerala Rivers is a good example and has proposed sand auditing of rivers for the preparation of District Survey Report. MoEFCC vide S.O 3611(E) dated 25.07.2018 issued guidelines for the preparation of District Survey Report (DSR). DSR was to be prepared by District Environment Impact Assessment Authority with the assistance of Irrigation Department or Forest Department or Public Works Department or Ground Water Department or Remote Sensing Department or Mining and Geology Department in the District. Hon'ble National Green Tribunal vide its order dated 14.10.2020 instructed that the DSR shall be prepared through consultants accredited by the National Accreditation Board of Education and Training/Quality Control Council of India in terms of the O.M of MoEFCC dated 16.03.2010. Thus DSR can be prepared for the districts by the above said consultants using the sand audit reports and other required information as per EMGSM-2020.

**NGT: “Whether any regulation or monitoring is provided regarding the quantum of sand to be mined and the manner in which it has to be done etc., including transport and disposal of the same &**

*“Whether all necessary permission under the environmental laws have been obtained from them and necessary mining plan have been provided and approved by the concerned Departments etc.”*

**Response:** Once Environment Clearance is granted, only the fixed /allocated amount of sand as per the clearance obtained will be collected by registered laborers under the supervision of the *Kadavu* Committees of Panchayath / Urban local bodies (authorized sand bank committees) established under the Kerala Protection of River Banks and Regulation of Removal of Sand Act 2001, and Rules 2002. Depth of mining as 3 meter or water level whichever is less as decided by Hon'ble Supreme Court in Deepak Kumar Vs State of Haryana judgment and other EC norms will be strictly followed in the State. Sand mining will also be monitored by District Expert Committee, Tahsildar and the officers entrusted by District Collector as per the provisions of Kerala Protection of River Banks and Regulation of Removal of Sand Act 2001 and Rules 2002. When mining permission is granted, necessary safeguards recommended by Sustainable Sand Mining Guidelines (SSMG)-2016 and EMGSM-2020 will also be ensured to prevent illegal or excess mining.

**NGT:** *“To report in the light of existing Rules and Guidelines whether sand mining in river bed passing through the forest areas and eco-sensitive zones like, National Park and Sanctuary etc., is going on and the status of such cases in the State of Kerala & whether permission is being granted in those areas/ buffer areas, whether the person to whom the permission is granted is obtaining necessary permission and sanction under the concerned forest and environmental laws for this purpose”*

**Response:** Sand mining from river bed is not being done in the State of Kerala since 2016. It will be done only after obtaining Environmental Clearance. Mine plan preparation by Recognized Qualified Person (RQP) of Mining & Geology Department is progressing in different districts. Sand mining

in river beds through the forest areas and eco-sensitive Zones like, National Parks and Wild Life Sanctuaries etc., is not carried out in Kerala. Desilting in Pamba River as part of Disaster Management is being dealt with in OA No. 75/2020 before the Hon'ble NGT (SZ, Chennai Bench).

*NGT: "Whether they (the Districts) are following a uniform method and whether they are complying with the directions issued by the Ministry of Environment, Forests and Climate Change (MoEFCC) in maintaining the sustainable sand mining policy in the State"*

**Response:** As per section 9 (b) of the Kerala Protection of River Banks and Removal of Sand Act 2001, it is a function of the District Expert Committee (DEC) to fix the total quantity of sand that can be removed from a Kadavu or river bank giving due regard to the guidelines of expert agencies like the National Centre for Earth Science Studies (NCESS) and Centre for Water Resources Development and Management (CWRDM) or other agencies in the sector, as may be specified by the Government from time to time. As per section 29 of the Kerala Protection of River Banks and Regulation of Removal of Sand Act 2001 and Rule 30 of the Kerala Protection of River Banks and Regulation of Removal of Sand Rules 2002, sand auditing is to be carried out once in every three years. Thus Government of Kerala is conducting sand auditing of rivers as per the standard guidelines of National Centre for Earth Science Studies (NCESS) since 2012 and the same was amended in 2017 based on the Supreme Court Order and orders issued by MoEFCC. An Expert Committee is constituted for this purpose by the Institute of Land and Disaster Management (ILDM), Thiruvananthapuram.

General conditions of sand removal in section 12 of the Kerala Protection of River Banks and Removal of Sand Act, 2001 and Sustainable Sand Mining Guidelines (SSMG) 2016 of MoEFCC are to be followed while implementing the sand removal operations and its transportation. Sand is collected by

registered laborers under the supervision of Kadavu committees of Panchayaths / Urban local bodies. Depth of mining as 3 meter or water level whichever is less as decided by Hon'ble Supreme Court in Deepak Kumar Vs State of Haryana judgment is to be strictly followed in the State. Sand mining is also monitored by kadavu committees. A three-tier system consisting of State High Level Committee (SHLC), District Expert Committee (DEC) and Kadavu Committee (KC) is functioning to monitor the sand mining operations in the State as per The Kerala Protection of River Banks and Regulation of Removal of Sand Act, 2001. An IT enabled on-line system called 'e-Manal' (e-Sand) was also developed (by NIC, Thrissur) and used (then when sand mining was in vogue) to ensure transparency in sand mining and distribution.

*NGT: "Whether any action has been taken by the authorities for conducting illegal mining in these areas, including excess mining than the permitted quantity and what are all the safeguards provided for preventing such illegal activities being done in the riverbed where mining is permitted by the Departments"*

**Response:** As such, no mining has been permitted by the Departments concerned. However, extensive powers are given to Revenue officials and Police to seize and confiscate vehicles, tools, implements used to illegally mine and transport river sand as per the provisions of Kerala Protection of River Banks and Regulation of Removal of Sand Act, 2001. Additional penalty can also be imposed now based on NGT's orders when vehicles are seized. According to this act, all the District Collectors and all the Tahsildars have their own squads which work 24x7 in order to check and prevent illegal sand mining across the State. By virtue of the section 20 of this act, if any person is found guilty and whoever contravenes the provisions of this act will be punishable with a fine up to a maximum of Rs. 25,000/- or imprisonment for 2 years or both. Moreover, as per section 23 of this Act the Revenue and Police officials

have the power to confiscate the vehicles that are used to transport sand without complying with the provisions of this Act. With the introduction of this Act, illegal sand mining in the rivers could be checked to a large extent. Sand mining will also be monitored by District Expert Committee, Tahsildar and the officers entrusted by the District Collector as per the provisions of Kerala Protection of River Banks and Regulation of Removal of Sand Act 2001 and Rules 2002.

Necessary safeguards recommended by SSMG-2016 and EMGSM-2020 will also be ensured for preventing illegal mining when mining permission is granted after obtaining EC.

Annexure: Sand Audit of Bharathapuzha River

Annexure: Sand Audit of Bharatapuzha River

Government have entrusted following three selected agencies with the task of conducting Sand Auditing of Bharatapuzha River flowing through Palakkad, Thrissur and Malappuram District on behalf of Dept. of Revenue as per G.O (MS) No.730/2019/RD dated 01/03/2019 based on Section 9(b) of Kerala Protection of River Banks and Regulation of Removal of Sand Act, 2001 and Rule Number 30 of River Protection Rules - 2002. Sand Audit is carried out based on the Standard Guidelines of National Centre for Earth Science Studies (NCESS), Thiruvananthapuram developed in 2012 and the same is further amended in 2017 based on the Supreme Court order and orders issued by MoEF& CC on Sustainable Sand Mining Management Guidelines, 2016. Field survey for sand audit was carried out during summer months of 2019 and the report was finalized in September 2020. The sand audit (91 km river length) was carried out in three stretches as mentioned below:

Sand Auditing of Bharatapuzha River						
Sl No	River	Allotted Length (km)	Agency	Sand Auditing		G.O Approving Sand Audit Report
				Starting Point	End Point	
1	Bharathapuzha (Stretch-1)	33 km	Dept of Geology and Environmental Science, Christ College, Irinjalakuda	Parail Bridge	Vazhalippadam Checkdam near Mannannur Railway Station	G.O (Rt) No. 1906/2020/RD dtd 25.05.2020
2	Bharathapuzha (Stretch-2)	29 km	Agriculture and Ecosystem Management Group (AGES), Thiruvananthapuram	Vazhalippadam Dam	Thrithala Regulator Cum Bridge	G.O (Rt) No. 2882/2020/RD dtd 16.09.2020

3	Bharatapuzha (Stretch-3)	29 km	Uralunga Contract operative Limited, Vadakara, Kozhikode	Labour Co-Society	Thrihala Regulator Cum Bridge	Chamravattom Regulator Cum Bridge	G.O (Rt) No. 874/2020/RD dtd 28.02.2020
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Sand Audit of Bharatapuzha was monitored by Institute of Land and Disaster Management (ILDM), Thiruvananthapuram and the verification of data was done accordingly.

#### Bharatapuzha River Stretch-1

Sand auditing of Bharatapuzha River Stretch-1 covered 33 km from Parli Bridge to Vazhalippadam Check Dam. As part of Sand auditing, cross sections are taken at 114 locations within the 33 km river stretch in Bharatapuzha River Stretch-1 with an average interval of 289.47 m. Lakkidi Peroor, Mankara, Parali, Peringottukurissi and Vaniyankulam panchayats and Otteppalam Municipality of Palakkad District and Panjal, Thiruvillwamala and Kolazhy Panchayats of Thrissur District are located on either banks of the river within this stretch.

#### Sand Availability in Bharatapuzha Stretch-1

Sl No.	Name of Panchayat	District	Volume of Total Sand (m <sup>3</sup> )	Volume Mineable (m <sup>3</sup> ) for three years	of Sand for three years
1	Lakkidi Peroor Panchayat	Palakkad	35352	26944	
2	Mankara Panchayat	Palakkad	4094	4094	
3	Ouappalam Municipality	Palakkad	419118	194542	
4	Parali Panchayat	Palakkad	Nil	0	
5	Peringottukurissi Panchayat	Palakkad	7476	5468	
6	Vaniyankulam Panchayat	Palakkad	719193	353380	
7	Panjal Panchayat	Thrissur	483477	179707	
8	Thiruvillwamala Panchayat	Thrissur	171313	104849	
9	Kolazhy Panchayat	Thrissur	622047	357611	
Total			2462070	1226595	

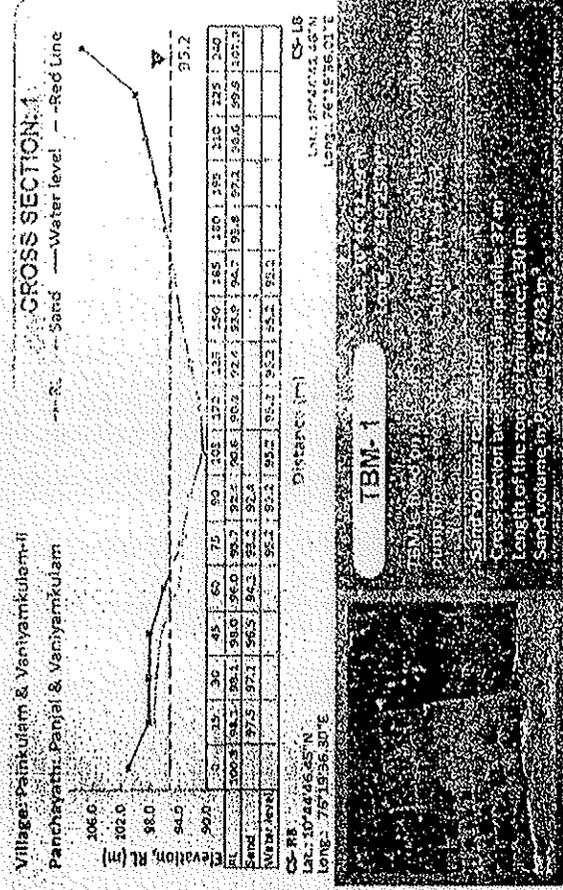
#### Sample Cross Section

**Bharatapuzha River Stretch-2**

Sand auditing of Bharatapuzha River Stretch-2 covered 29 km from Vazhalippadam Check Dam to Thrithala Regulator Cum Bridge. As part of Sand auditing, cross-sections are taken at 161 locations within the 29 km river stretch in Bharatapuzha River Stretch-2 with an average interval of 180 m. Vaniyamkulam, Ongallur, Muthuthala, Paruthur, Thirumittacode, Thrithala, and Pattithara Panchayats, Pattambi Municipality, and Shornur Municipality of Palakkad District; and Panjal, Vallathol Nagar and Deshamangalam Panchayats of Thrissur District are the local bodies located on either bank of the river within this stretch.

**Sand Availability in Bharatapuzha Stretch-2**

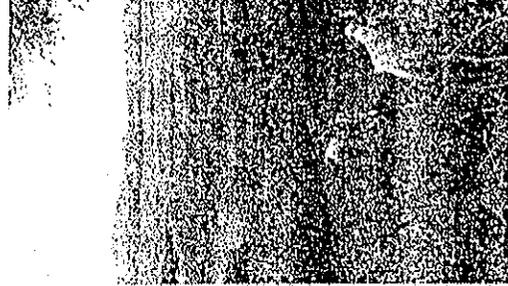
Sl No.	Name of Panchayat	District	Volume of Total Sand (m <sup>3</sup> )	Volume of Mineable Sand (m <sup>3</sup> ) for three years
1	Vaniyamkulam Panchayat	Palakkad	619782.06	301781.46
2	Ongallur Panchayat	Palakkad	795033.81	357621.77
3	Muthuthala Panchayat	Palakkad	374659.09	49607
				il
				44.69
				il
				il
				143.6
				27.87



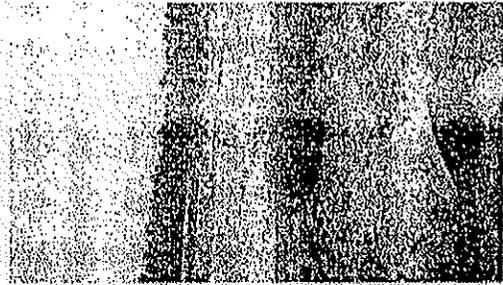


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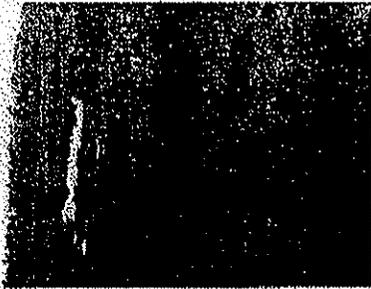
15 VIEWS OF BHARATHAPUZHA RIVER AT VARIOUS LOCATIONS



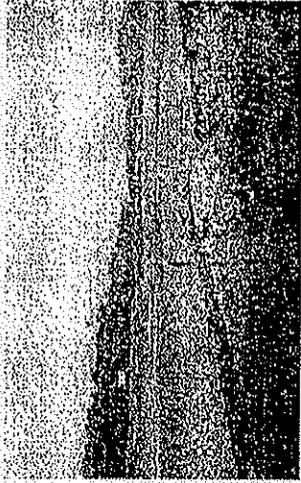
15-1



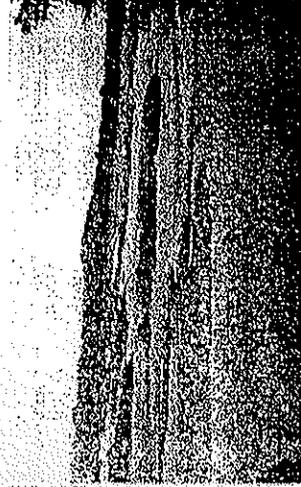
15-2



15-3



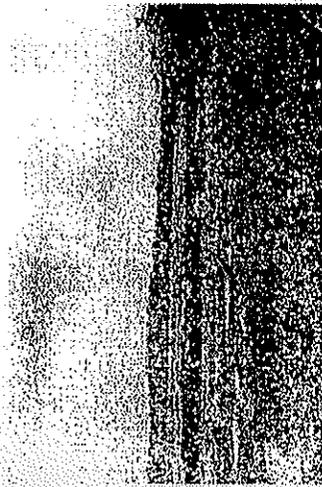
View from Highway 100



View from Highway 100

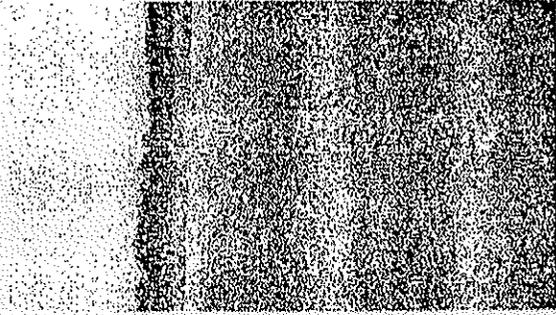


View from Highway 100

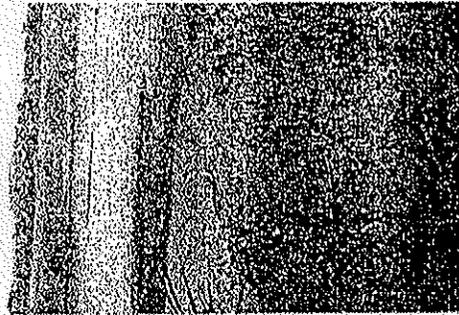


View from Highway 100

2



View from Highway 100



View from Highway 100



View from Highway 100 (Christmas Eve)

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### Bharatapuzha River Stretch-3

Sand auditing of Bharatapuzha River Stretch-3 covered 29 km from Trithala Regulator Cum Bridge to Chamravattom Regulator Cum Bridge. As part of Sand auditing, cross sections are taken at 153 locations within the 29 km river stretch in Bharatapuzha River Stretch-3 with an average interval of 189.54 m. Pattithara, Parudur, and Anakkara panchayats of Palakkad District and Imbilyam, Kutippuram, Thirunavaya, Triprangode, and Tavanur panchayats of Palakkad District are located on either banks of the river.

### Sand Availability in Bharatapuzha River Stretch-3

Sl No.	Name of Panchayat	District	Volume of Total Sand (m <sup>3</sup> )	Volume of Mineable Sand (m <sup>3</sup> ) for three years
1	Pattithara Panchayat	Palakkad	534744.72	332996.56
2	Paruthur Panchayat	Palakkad	698172.97	600110.57
3	Anakkara Panchayat	Palakkad	1623573.01	1086984.32
4	Imbilyam Panchayat	Maleppuram	329407.89	243653.59
5	Kutippuram Panchayat	Maleppuram	2883659.94	2029799.29
6	Thirunavaya Panchayat	Maleppuram	382848.02	151915.01
7	Triprangode Panchayat	Maleppuram	865722.06	20502.09
8	Tavanur Panchayat	Maleppuram	3136376.26	1178870.24
Total			10504504.86	5644831.67

**CROSS SECTION PROFILE 3**  
 Paralur - Pattibam Panchayat  
 Chainage 545 m

FIELD BOOK		
STATION	RED	WHITE
1	81.25	81.25
2	81.25	81.25
3	81.25	81.25
4	81.25	81.25
5	81.25	81.25
6	81.25	81.25
7	81.25	81.25
8	81.25	81.25
9	81.25	81.25
10	81.25	81.25
11	81.25	81.25
12	81.25	81.25
13	81.25	81.25
14	81.25	81.25
15	81.25	81.25
16	81.25	81.25
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35	81.25	81.25
36	81.25	81.25
37	81.25	81.25
38	81.25	81.25
39	81.25	81.25
40	81.25	81.25
41	81.25	81.25
42	81.25	81.25
43	81.25	81.25
44	81.25	81.25
45	81.25	81.25
46	81.25	81.25
47	81.25	81.25
48	81.25	81.25
49	81.25	81.25
50	81.25	81.25

**CROSS SECTION MAP**

**IDENTIFICATION OF TBM**

**TBM - 2**

TBM-2 is fixed on right side corner of the pump house,  
 KSEB 116539-096691

**SAND VOLUME ESTIMATION**

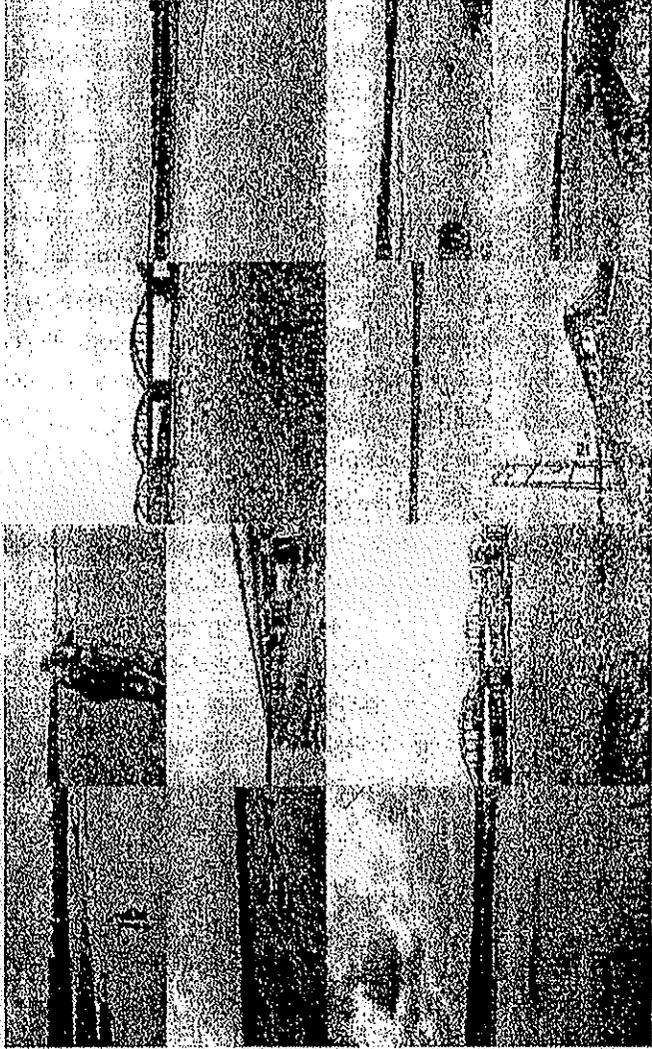
Cross section area of Sand in Profile = 550.7266 sq. m  
 Width of the Zone of Influence = 162.242 m  
 Sand Volume in the Profile 2 = 50973.32047 cu. m

**MINEABLE SAND**

R. L. of TBM = 96.17 m  
 P. L. of SWL = 37.845 m  
 SWL is 5.825 m below the R. L. of TBM  
 Mineable sand volume = 5476.55545 sq. m

Selected field photographs from Bharatapuzha Stretch-3 Sand Audit Report

FILM PHOTOS



10.03.2021

Sd/-  
Director, ILDM

Received by -  
16/3/21  
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