

SAND AUDITING IN NEYYAR RIVER

Report



Co-ordinator

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R. Anilkumar

Introduction

Sand has become a very important mineral for the expansion of society. Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. River sand is one of the world's most plentiful resources (perhaps as much as 20% of the Earth's crust is sand) and has the ability to replenish itself. River sand is vital for human well-being and for sustenance of rivers.

As a resource, sand by definition is 'a loose, incoherent mass of mineral materials and is a product of natural processes.' These processes are the disintegration of rocks and corals under the influence of weathering and abrasion. When sand is freshly formed the particles are usually angular and sharply pointed but they grow gradually smaller and more rounded as they become constantly worn down by the wind or water.

Sand has become a very important mineral for our society due to its many uses. The role of sand is very vital with regards to the protection of the environment. On average, people 'use' over 200kg of sand per person per year. This sand is taken from what are essentially non-renewable resources.

Sand Mining is an activity referring to the process of the actual removal of sand from the foreshore including rivers, streams and lakes. Sand is mined from beaches and inland dunes and dredged from ocean beds and river beds. Individuals and private companies are increasingly demanding sand for construction purposes and this has placed immense pressure on sand resources. It is a practice that is becoming an environmental issue as the demand for sand increases in industry and construction.

Sand Mining in India is adversely affecting the rivers, sea, forests & environment. Illegal mining of Sand and the lack of governance, in a big way is causing land degradation and threatened its rivers with extinction. Mining of sand, for instance, is depleting the waters of the rivers. Weak governance and rampant corruption are facilitating uncontrolled and illegal mining of sand and gravel in the rivers, threatening their very existence.. This unrestrained and unregulated activity is posing threats of widespread depletion of water resources which may lead to avoidable food shortages and hardships for the people.

River Bharathapuzha in Kerala has become a victim of indiscriminate sand mining. "Despite numerous prohibitions and regulations, sand mining continues rapidly on the riverbed of the Bharathapuzha. Water tables have dropped dramatically and a land once known for its plentiful rice harvest now faces scarcity of water..". In the villages and towns around the river, groundwater levels have fallen drastically and wells are almost perennially dry.

River sand auditing is a procedure to evaluate the processes and environmental effects of sand mining in a river or a portion of a river after a specific period of sand mining. This exercise has to be undertaken to know how far the mining process and its execution in a river or part of a river has helped to minimize the negative effects of sand mining on one side and maximize the positive effects on the other.

Taking a serious note on the impact of river sand mining, the Govt. of Kerala enacted the legislation "The Kerala Protection of River Banks and Regulation of Removal of Sand Act 2001" to protect the river environments from large scale dredging of sand. The act also envisages provisions for periodical sand auditing in order to assess the feasibility of sand mining in rivers of Kerala.

In tune with the provisions of sand auditing of Kerala rivers within the ambit of the legislation, an ideal methodology has been evolved by Centre for Earth Science Studies, Thiruvananthapuram, for sand auditing. CESS has undertaken two sand audit studies, one in Periyar and the other in Manimala river and submitted their major observations, findings and recommendations to the funding agencies for appropriate action. The sand audit studies carried out by CESS revealed that the Periyar and Manimala rivers have been degraded considerably due to the uncontrolled sand mining over the past three to four decades.

The Neyyar River in southern Kerala has been taken for the river sand auditing programme as per the directions given by State High Level Committee for River Management, Dept. of Revenue, Govt. of Kerala.

The objectives of the investigation were:

- To examine the river cross-section (profile) at regular intervals of Neyyar River from the midland to the coast.
- To prepare the river profile and audit the sand content of each cross section, if available.
- To calculate the availability of sand, if it is present, for Panchayat wise allocation.

Methodology for sand auditing:

In cross sections where the depth of water column is <5m, the depth of gravel/sand/silt/clay was measured along the cross section, at the above water depth measuring spots, by pitting, coring or spiking method using a G.I. pipe in the river channel bed. The thickness of sand bed up to 2m depth from the summer levels is to be obtained for computational purposes. In profiles where rocky bottom was noticed, it was recorded as rocky bed in the field book. All the measurements were recorded in the field book.

The depth of gravel/sand/silt/clay was plotted in the above profiles using conventional symbols. Thus a total of 90 profiles were constructed covering all the 90 profile locations (fig.2.1).

For allocating sand resource to various panchayats and Municipality in the Neyyar River Basin, the following method can be resorted to. If either side of a segment of river falls in the same panchayat, the sum of volume of sand in the corresponding cross-sections within the panchayat is calculated and can be considered as the total volume of sand available for that panchayat. On the other hand, if either sides of the river belong to different panchayats the total available sand must be allocated equally between the panchayats.

Chapter II

SUMMARY AND CONCLUSION

A total of 90 cross-sections were selected for river sand auditing study in the Neyyar River starting from east, near to Neyyar Irrigation Dam, to Poovar in the west. The portrait of these profiles, profile locations and the photographs of the temporary bench-marks are given in the following pages.

Table 3.1 summarizes the profile wise sand auditing in Neyyar River.

Profile-No	Location	Distance from starting point in (m)	Sand Quantity
NRC-1	KallikkadPanchayat	120	Nill
NRC-2	KallikkadPanchayat	620	Nill
NRC-3	KallikkadPanchayat	972	Nill
NRC-4	KallikkadPanchayat	1362	Nill
NRC-5	KallikkadPanchayat	1875	Nill
NRC-6	KallikkadPanchayat	2331	Nill
NRC-7	KallikkadPanchayat	2581	Nill
NRC-8	PoovachalPanchayat	2981	Nill
NRC-9	PoovachalPanchayat	3545	Nill
NRC-10	PoovachalPanchayat	4277	Nill
NRC-11	KallikkadPanchayat	4949	Nill
NRC-12	OttasekharamangalamPanchayat	5099	Nill
NRC-13	PoovachalPanchayat	5727.5	Nill
NRC-14	PoovachalPanchayat	6205.8	Nill
NRC-15	PoovachalPanchayat	6705	Nill
NRC-16	KattakkadaPanchayat	7155	Nill

NRC-17	KattakkadaPanchayat	7751	Nill
NRC-18	KattakkadaPanchayat	8095	Nill
NRC-19	OttasekharamangalamPanchayat	8423	Nill
NRC-20	OttasekharamangalamPanchayat	8998	Nill
NRC-21	OttasekharamangalamPanchayat	9136	Nill
NRC-22	KattakkadaPanchayat	9595	Nill
NRC-23	OttasekharamangalamPanchayat	10361	Nill
NRC-24	KattakkadaPanchayat	10701	Nill
NRC-25	OttasekharamangalamPanchayat	10894	Nill
NRC-26	OttasekharamangalamPanchayat	11515	Nill
NRC-27	KattakkadaPanchayat	11940	Nill
NRC-28	AryancodePanchayat	12217	Nill
NRC-29	AryancodePanchayat	12660	Nill
NRC-30	AryancodePanchayat	13266	Nill
NRC-31	AryancodePanchayat	13908	Nill
NRC-32	AryancodePanchayat	14393	Nill
NRC-33	AryancodePanchayat	14637	Nill
NRC-34	AryancodePanchayat	15002	Nill
NRC-35	AryancodePanchayat	15511	Nill
NRC-36	AryancodePanchayat	15826	Nill
NRC-37	AryancodePanchayat	16175	Nill
NRC-38	AryancodePanchayat	16920	Nill
NRC-39	MaranalloorPanchayat	17480	Nill
NRC-40	MaranalloorPanchayat	18092	Nill

NRC-41	AryancodePanchayat	18381	Nill
NRC-42	NeyyattinkaraMunicipality	18688	Nill
NRC-43	NeyyattinkaraMunicipality	19051	Nill
NRC-44	NeyyattinkaraMunicipality	19530	Nill
NRC-45	NeyyattinkaraMunicipality	20010	Nill
NRC-46	NeyyattinkaraMunicipality	20603	Nill
NRC-47	NeyyattinkaraMunicipality	20843	Nill
NRC-48	PerumkadavilaPanchayat	21261	Nill
NRC-49	PerumkadavilaPanchayat	21665	Nill
NRC-50	PerumkadavilaPanchayat	22193	Nill
NRC-51	NeyyattinkaraMunicipality	22566	Nill
NRC-52	PerumkadavilaPanchayat	22960	Nill
NRC-53	NeyyattinkaraMunicipality	23532	Nill
NRC-54	NeyyattinkaraMunicipality	23798	Nill
NRC-55	NeyyattinkaraMunicipality	24000	Nill
NRC-56	NeyyattinkaraMunicipality	24782	Nill
NRC-57	NeyyattinkaraMunicipality	25005	Nill
NRC-58	NeyyattinkaraMunicipality	25654	Nill
NRC-59	NeyyattinkaraMunicipality	25871	Nill
NRC-60	NeyyattinkaraMunicipality	26151	Nill
NRC-61	NeyyattinkaraMunicipality	26471	Nill
NRC-62	NeyyattinkaraMunicipality	27110	Nill
NRC-63	NeyyattinkaraMunicipality	27352	Nill
NRC-64	NeyyattinkaraMunicipality	27580	Nill

NRC-65	NeyyattinkaraMunicipality	28110	Nill
NRC-66	NeyyattinkaraMunicipality	28545	Nill
NRC-67	NeyyattinkaraMunicipality	29904	Nill
NRC-68	ChenkalPanchayat	29625	Nill
NRC-69	ChenkalPanchayat	30153	Nill
NRC-70	NeyyattinkaraMunicipality	30623	Nill
NRC-71	NeyyattinkaraMunicipality	30922	Nill
NRC-72	NeyyattinkaraMunicipality	31314	Nill
NRC-73	NeyyattinkaraMunicipality	31592	Nill
NRC-74	NeyyattinkaraMunicipality	32060	Nill
NRC-75	ChenkalPanchayat	32442	Nill
NRC-76	ThirupuramPanchayat	33086	Nill
NRC-77	ThirupuramPanchayat	33620	Nill
NRC-78	ThirupuramPanchayat	33880	Nill
NRC-79	ThirupuramPanchayat	34196	Nill
NRC-80	ThirupuramPanchayat	34745	Nill
NRC-81	ThirupuramPanchayat	35173	Nill
NRC-82	ThirupuramPanchayat	35770	Nill
NRC-83	ThirupuramPanchayat	36022	Nill
NRC-84	ThirupuramPanchayat	36342	Nill
NRC-85	ThirupuramPanchayat	36621	Nill
NRC-86	KulathoorPanchayat	37155	Nill
NRC-87	KulathoorPanchayat	37610	Nill
NRC-88	poovarPanchayat	37834	Nill

NRC-89	poovarPanchayat	38133	Nill
NRC-90	poovarPanchayat	38490	Nill

The analysis for sand auditing of Neyyar River has been done for a distance of about 40 km starting from the point near to Neyyar Irrigation Dam in the east to Poovar in the west. A total of 90 cross-sections were prepared covering the 12 panchayats and a Municipality, Neyyattinkara Municipality, through which the river flows. The various characteristics of the profiles, viz., width, depth, nature of bottom materials, and nature of bank slope were measured from the field.

Sand deposits could not be recognized in any of these 90 cross-sections/profiles that were taken from the middle and lower reaches of the river. Therefore no allocation of sand is made for any of the local bodies fall with in the River Basin.

It is observed during investigation that illegal sand mining is rampant along the course of the river either by digging the clayey bed and subsequently washing the loosened river material or by collapsing the land portions on the sides of the river and subsequently washing the material in the water to collect sand. The latter activity has led to the broadening of the river which will result in the death of the river. It can be clearly seen, that the natural alignment and the course of the river has been substantially altered which poses threat to the very existence of the river. Therefore, it is recommended that for a reasonable period no sand mining from the Neyyar River should be permitted. However, a fresh sand auditing should be made before giving permission to mine sand from the river in order to ascertain that the river has attained the status to provide sand by annual replenishment.

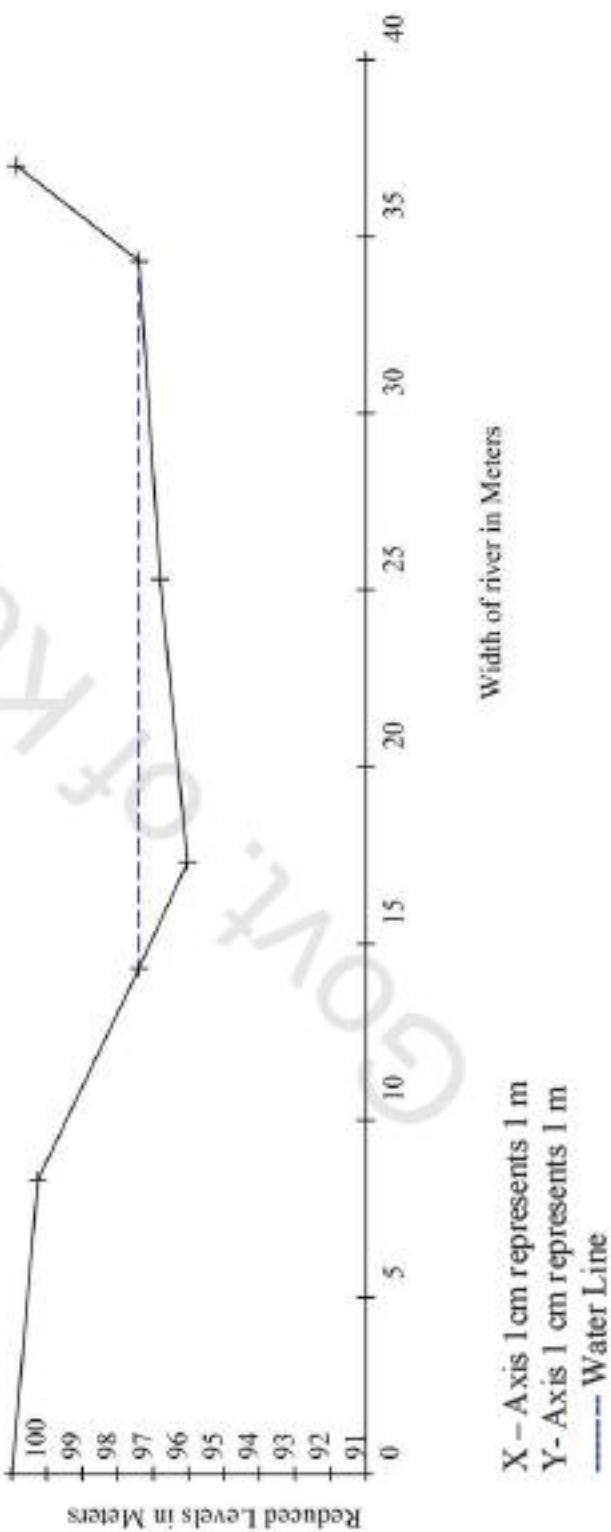
Profile-1
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.55m			100.55	100	BM	0
	1.29			99.26	RBP	8.3
	4.150			96.4	RBWL	14.3
	1.365(5.515)			95.035	WD	17.3
	.0.59(4.74)			95.81	WD	25.3
	4.150			96.4	LBWL	34.3
	1.9			98.65	LBP	37

This river cross-section has taken 120 m downstream of Neyyar reservoir bridge . The bench mark here is top part of compound wall of a house on the right bank (House No.157, Canan Foundation) which falls in the 4th ward of Kallikkad Gramapanchayat of Nedumangd Takuk.



PROFILE - 1
KALLIKKAD GRAMA PANCHAYAT
TBM: Top part of compound wall on the right bank



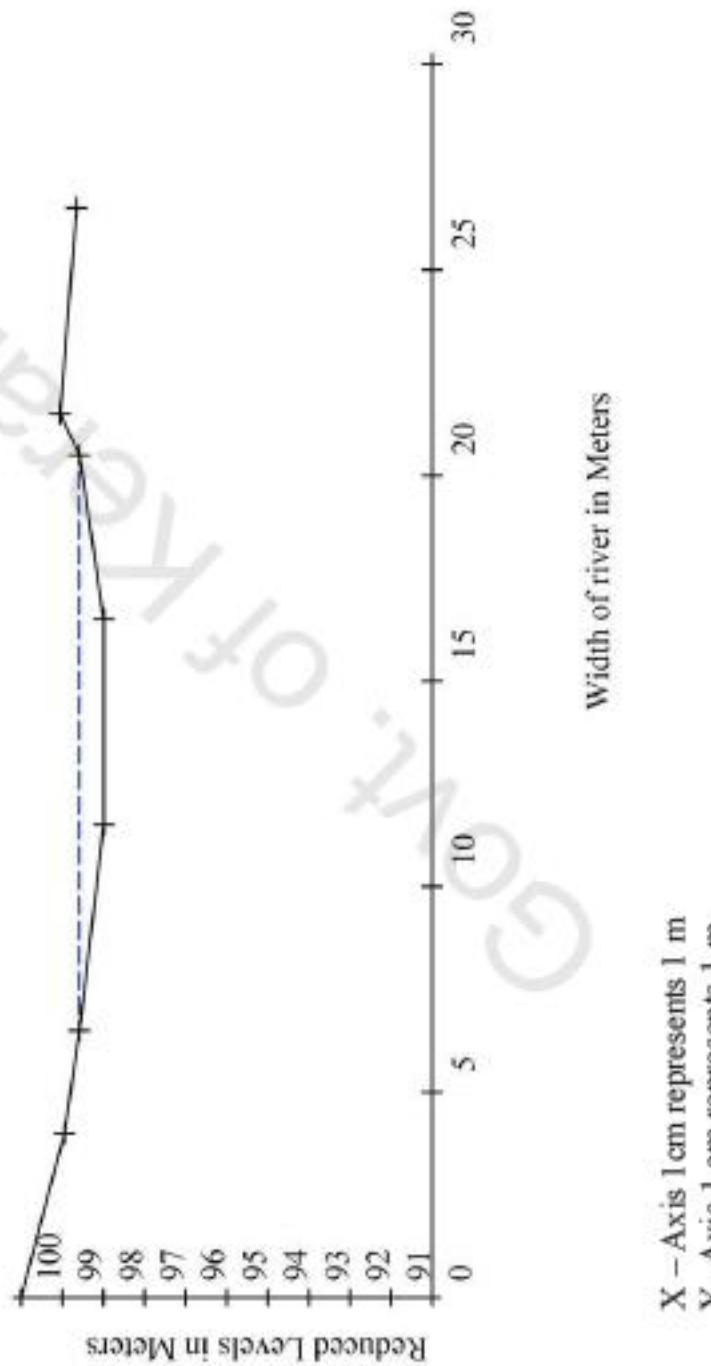
Profile-2
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.150			100.150	100	BM	0
	1.210			98.94	RBP	4
	1.570			98.58	RBWL	6.5
	.60(2.17)			97.98	WD	11.5
	.60(2.17)			97.98	WD	16.5
	1.57			98.58	LPWL	20.5
	1.10			99.05	LBP	21.5
		1.5		98.65	LBP	26.5

The present river cross-section has taken 500 m downstream of Neyyar Reservoir Bridge. The bench mark of this profile is on a rock exposure which falls in the Kallikkad ward of Kallikkad grama panchayat on the right bank of Neyyar river. A poultry farm is found on the way to the river on the right bank.



PROFILE - 2
KALLIKKAD GRAMA PANCHAYAT
TBM: Rock exposure on the right bank



Profile 3

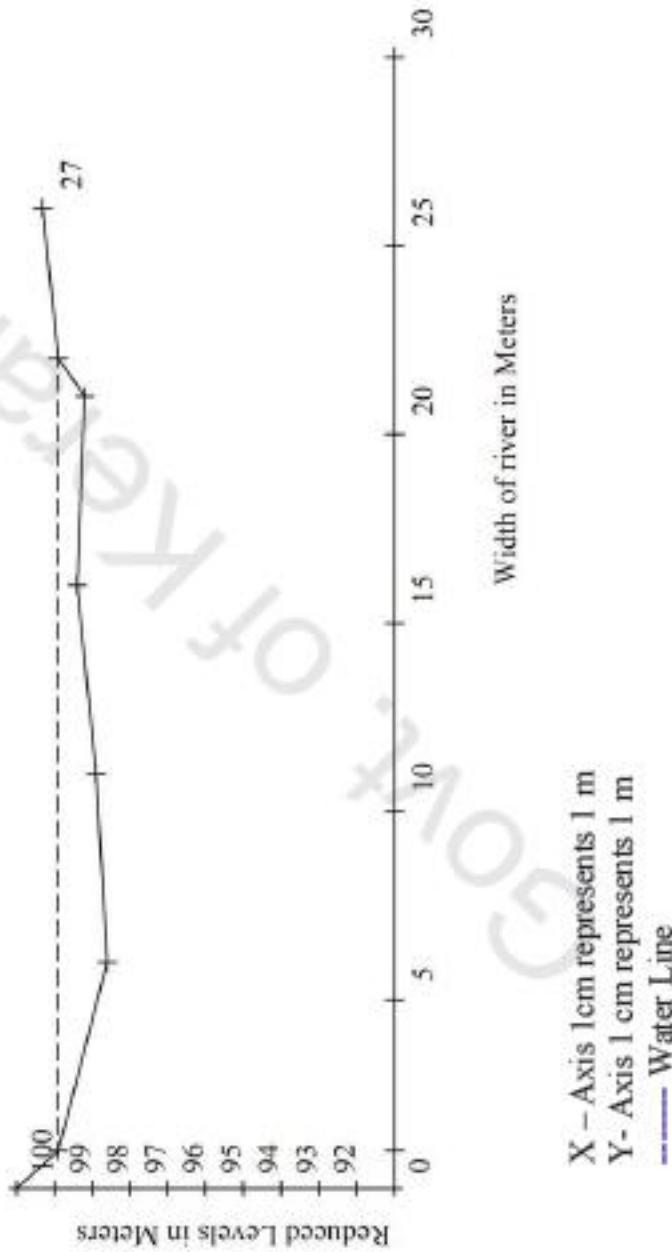
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.62			100.62	100	BM	0
	1.72			98.9	RBWL	1
	1.30(3.02)			97.6	WD	6
	1.00(2.72)			97.9	WD	11
	0.50(2.22)			98.4	WD	16
	0.72(2.42)			98.2	WD	21
	1.72			98.9	LBWL	22
		1.30		99.32	LBP	26

The current river cross-section has taken from Mannadikadu which is 720 m downstream of Neyyar Reservoir Bridge. The bench mark of the present profile is on a rock exposure which falls in the Kallikkad ward of Kallikkad grama panchayat on the right bank of Neyyar river.



PROFILE - 3
KALLIKAD GRAMA PANCHAYAT
TBM: Rock Exposure on the right bank at Mannadimoola Kadavu



Profile-4

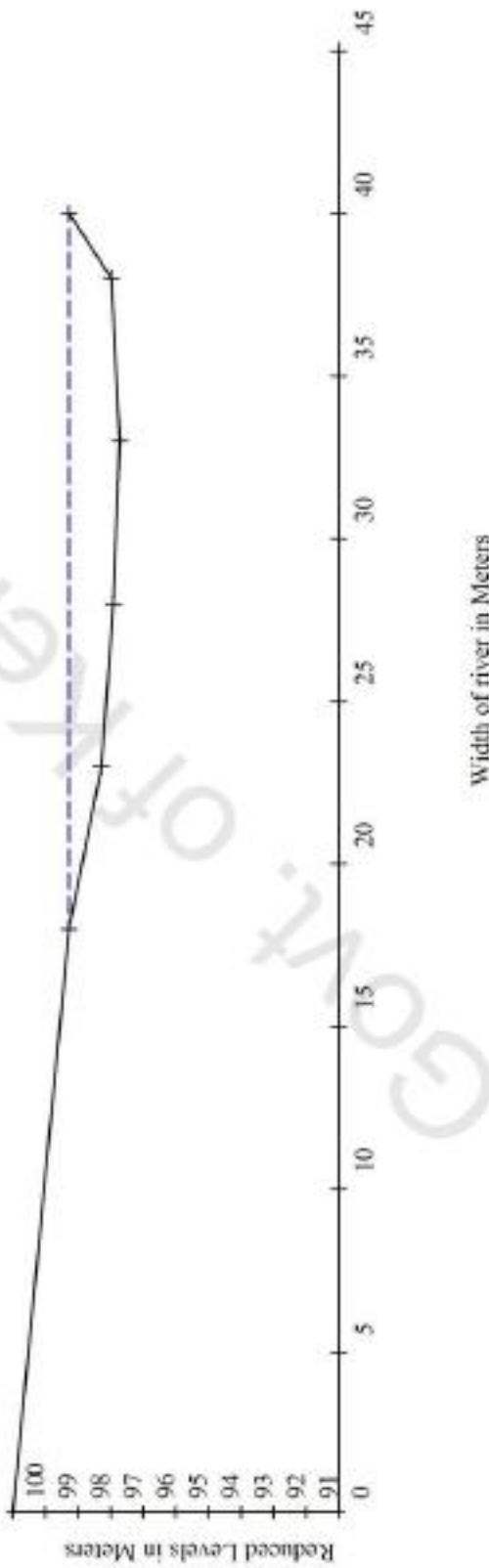
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.215			100.215	100	BM	0
	1.93			98.28	RBWL	18
	0.99(2.92)			97.29	WD	23
	1.36(3.29)			96.92	WD	28
	1.570(3.5)			96.715	WD	33
	1.30(3.23)			96.98	WD	38
		1.93		98.28	LBWL	40

This river cross-section has taken from Perinjankaduvu . The bench mark of the present profile is on the sidewall of Perinjankadavu which falls in the Perinjankadavu ward of Kallikkad gram panchayat on the right bank of Neyyar river.



PROFILE - 4
KALLIKKAD GRAMA PANCHAYAT
TBM: Side wall on the right bank at Perinjam kadavu



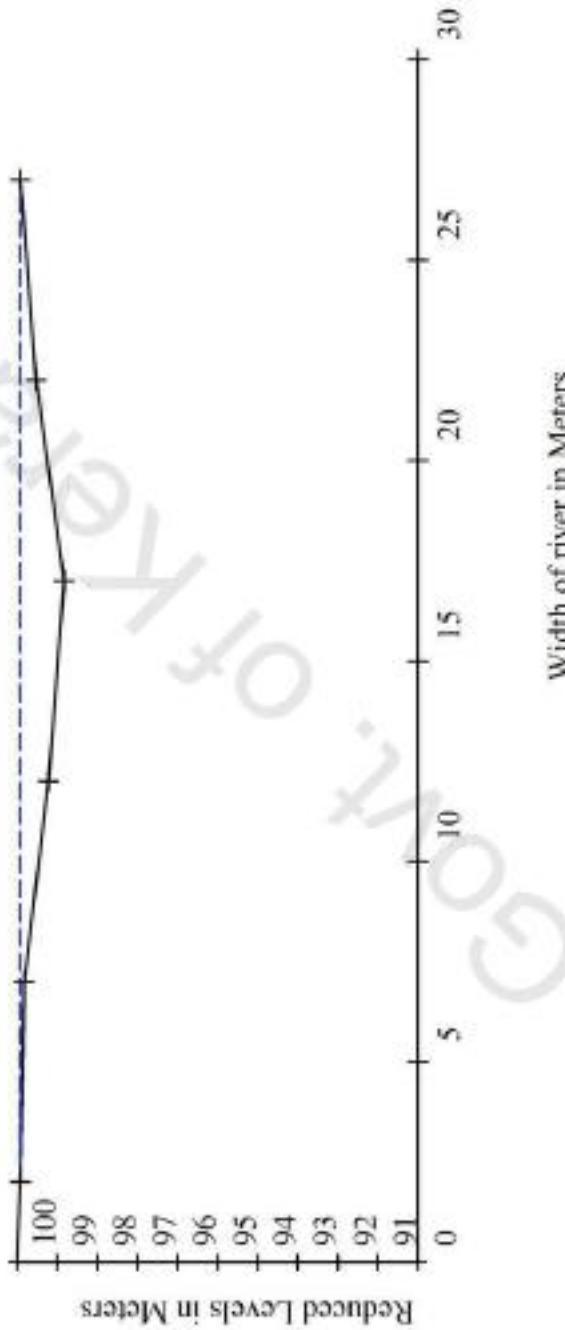
Profile-5
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
3.54			103.54	100	BM (LB)	0
	3.62			99.92	LBWL	2
	.10(3.72)			99.82	WD	7
	.70(4.32)			99.22	WD	12
	1.10(4.72)			98.82	WD	17
	6.40(4.02)			99.52	WD	22
		3.62		99.92	RWL	27

The present river cross-section has taken from Cherinjankonam kadvu . The bench mark of the present profile is the meeting point of Cherinjankonam thodu to the Neyyar River on the left bank. The benchmark falls in the Mailakkara ward of Kallikkadu Gramapanchayat.



PROFILE - 5
KALLIKKAD GRAMA PANCHAYAT
TBM: Cherinjam Thode joins on the left bank



X - Axis 1 cm represents 1 m
Y - Axis 1 cm represents 1 m
— Water Line

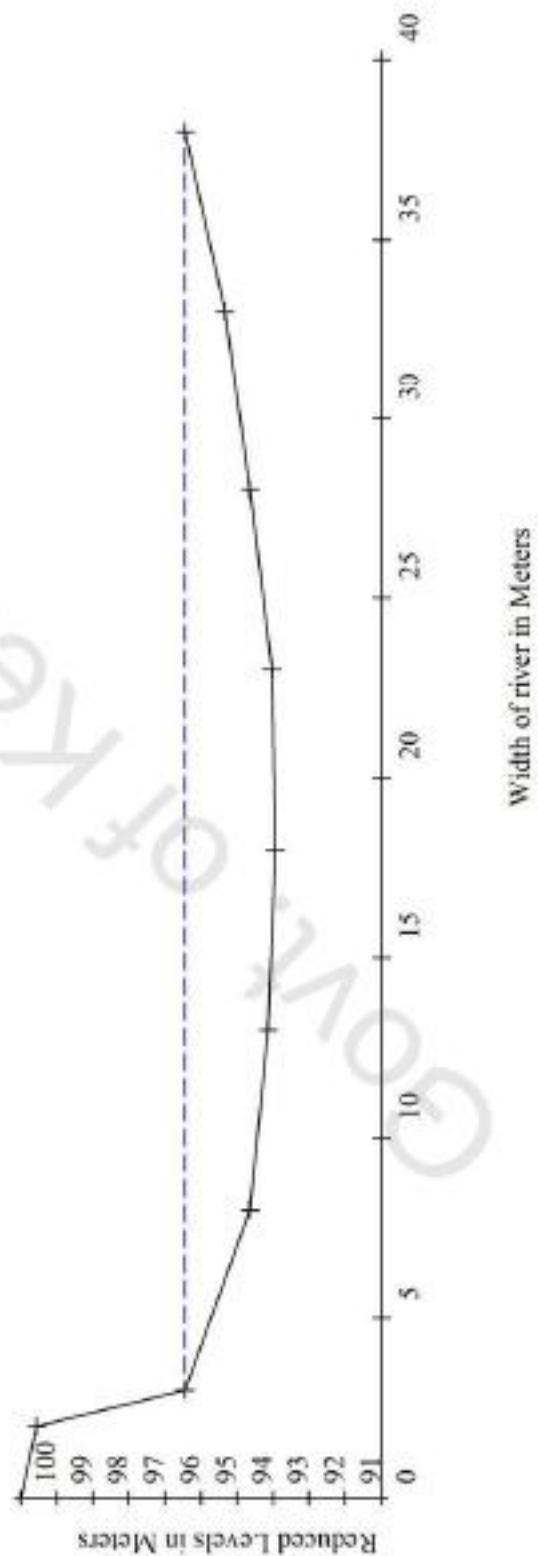
Profile-6
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.21			100.21	100	BM(RB)	0
	0.65			99.56	RBP	2
	4.77			95.44	RBWL	3
	1.80(6.57)			93.64	WD	8
	2.30(7.07)			93.14	WD	13
	2.50(7.27)			92.94	WD	18
	2.40(7.17)			93.04	WD	23
	1.80(6.57)			93.64	WD	28
	1.10(5.87)			94.34	WD	33
		4.77		95.44	LBWL	38

The present river cross-section has taken 80 m north of Kallikkad Bridge. The bench mark of the present profile is on a rock exposure at pazhayakottappuram of Kallikkadu Gramapanchayat on the right bank.



PROFILE - 6
KALLIKKAD GRAMA PANCHAYAT
TBM: Rock Exposure on the right bank at Pazhayakottapuram



Profile - 7

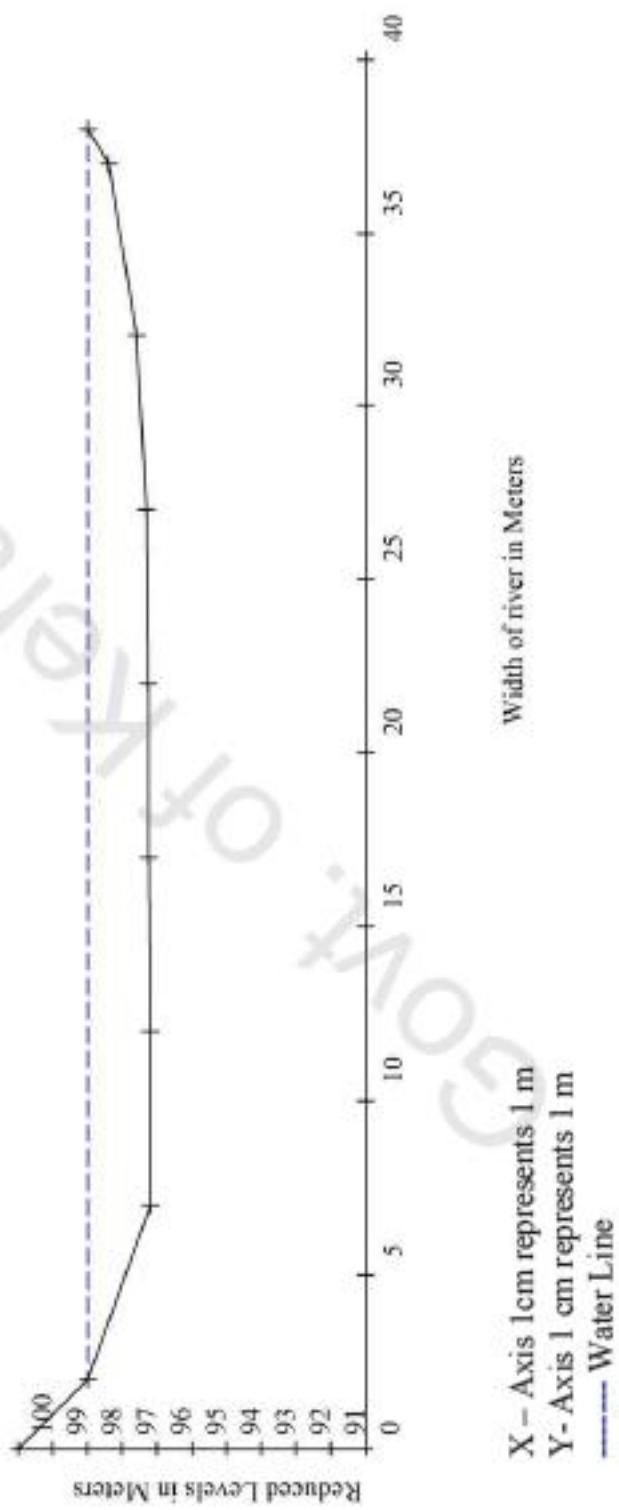
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.50			101.5	100	LB(BM)	0
	3.51			97.99	LBWL	2
	1.80 (5.31)			96.19	WD	7m
	1.80 (5.31)			96.19	WD	12
	1.75 (5.26)			96.24	WD	17
	1.74 (5.25)			96.25	WD	22
	1.68 (5.19)			96.31	WD	27
	1.40 (4.91)			96.59	WD	32
	0.60 (4.11)			97.39	WD	37
		3.51		97.99	RBWL	38

This river cross-section has taken 340 m south of Kallikkad Bridge. The bench mark of the present profile is on the water tank of Kerala Water Authority which falls in the Mailakkara ward of Kallikkad grama panchayat on the left bank of Neyyar river. A check dam is also found across the river.



PROFILE - 7
KALLIKKAD GRAMA PANCHAYAT
TBM: KWA Water tank on the left bank at Mailakkara



Profile - 8

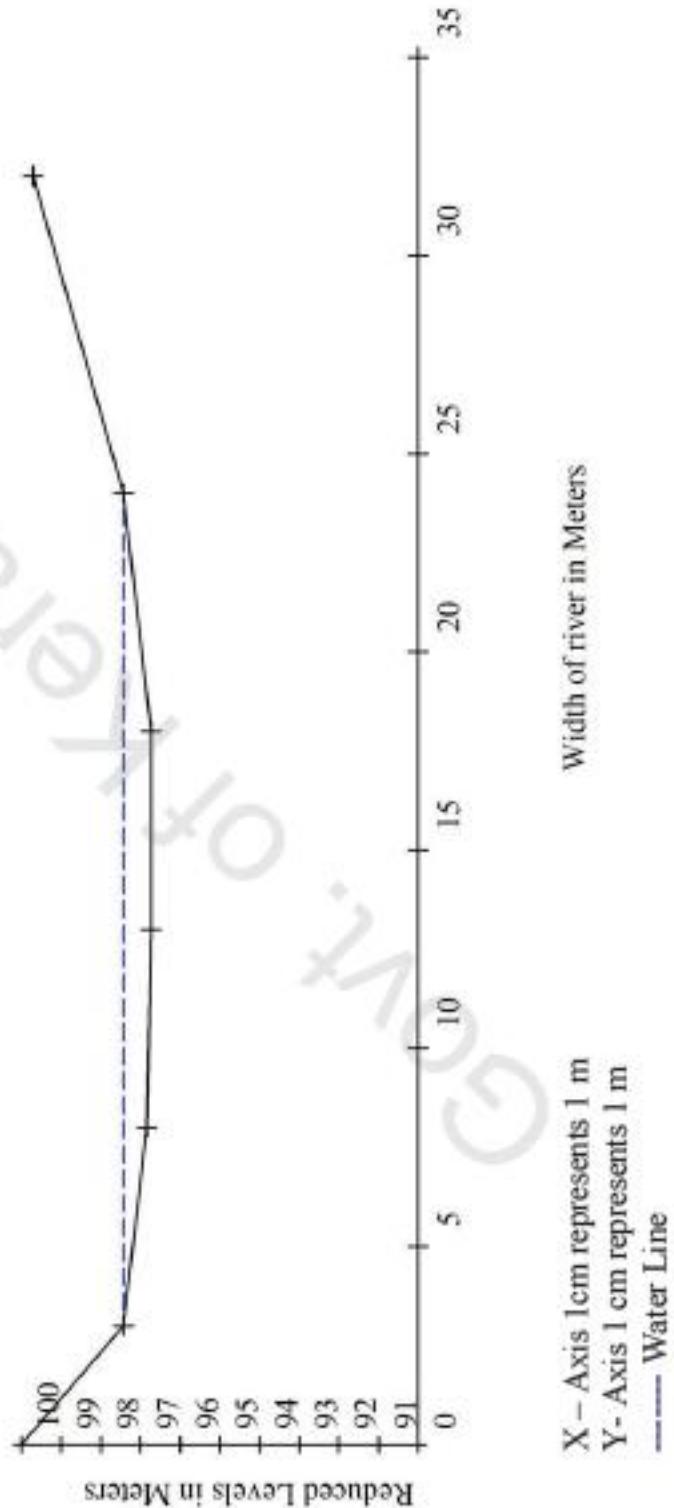
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.57			100.57	100	BM (RB)	0
	3.135			97.435	RBWL	3
	0.60 (3.735)			96.835	WD	8
	0.70 (3.835)			96.735	WD	13
	0.70 (3.835)			96.735	WD	18
	0.40 (5.535)			95.035	WD	23
	3.135			97.435	LBWL	24
					LBP	32

This river cross-section has taken from Therikkamannadi kadavu of Poovachal Panchayat. The bench mark of the present profile is at the edge of sidewall of kadavu on the right bank of Neyyar River. A small unmetalled road is joins with the river on the right bank.



PROFILE - 8
POOVACHAL GRAMA PANCHAYAT
TBM: Top part of side wall constructed on the right bank at Therikkannadikadavu



Profile - 9

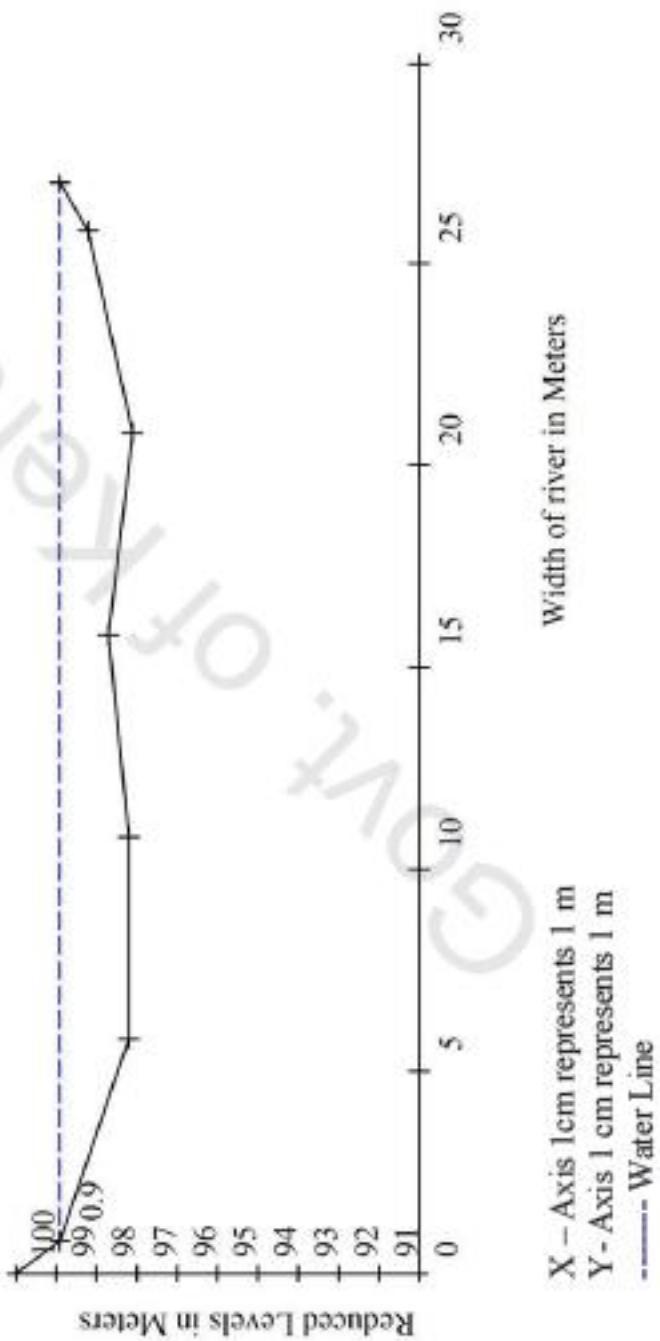
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.40			100.4	100	BM (RB)	0
	1.50			98.9	RBWL	0.8m
	1.70 (3.2)			97.2	WD	5.8
	1.50 (3)			97.4	WD	10.8
	1.20 (2.7)			97.7	WD	15.8
	1.80 (3.3)			97.1	WD	20.8
	0.70 (2.2)			98.2	WD	25.8
	1.50			98.9	RBWL	27

This river cross-section has taken from Thalayaichampara of Poovachal Panchayat. The bench mark of the current profile on a rock exposure on the right bank of Neyyar River. A bricklin is found on the right bank.



PROFILE - 9
POOVACHAL GRAMA PANCHAYAT
TBM: Rock Exposure on the right bank at Thalayadichampara



Profile - 10

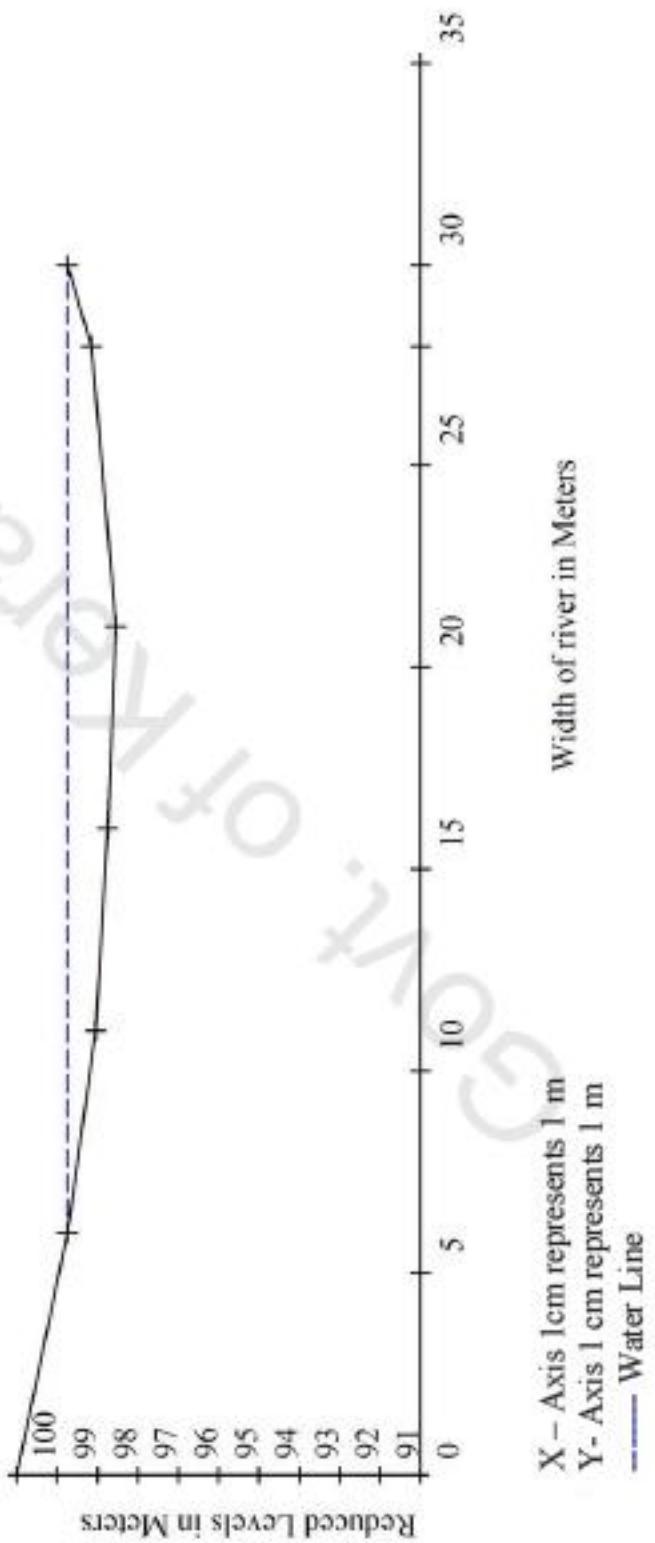
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.1			101.1	100	(BM) RBP	0
	2.35			98.75	RBWL	6
	0.70 (3.05)			98.05	WD	11
	1.0 (3.35)			97.15	WD	16
	1.2 (3.55)			97.55	WD	21
	0.90 (3.25)			97.85	WD	26
	0.60 (2.95)			98.15	WD	28
	2.35			98.75	LBWL	30

This river cross-section has taken from Kollaru Kadavu of Poovachal Panchayat. The bench mark of the current profile is on a stone on the road side at right bank of Neyyar River. A small road to Veeranakavu from the Kadavu is found.



PROFILE - 10
POOVACHAL GRAMA PANCHAYAT
TBM: Road joining Kollaru Kadavu on the right bank



Profile - 11

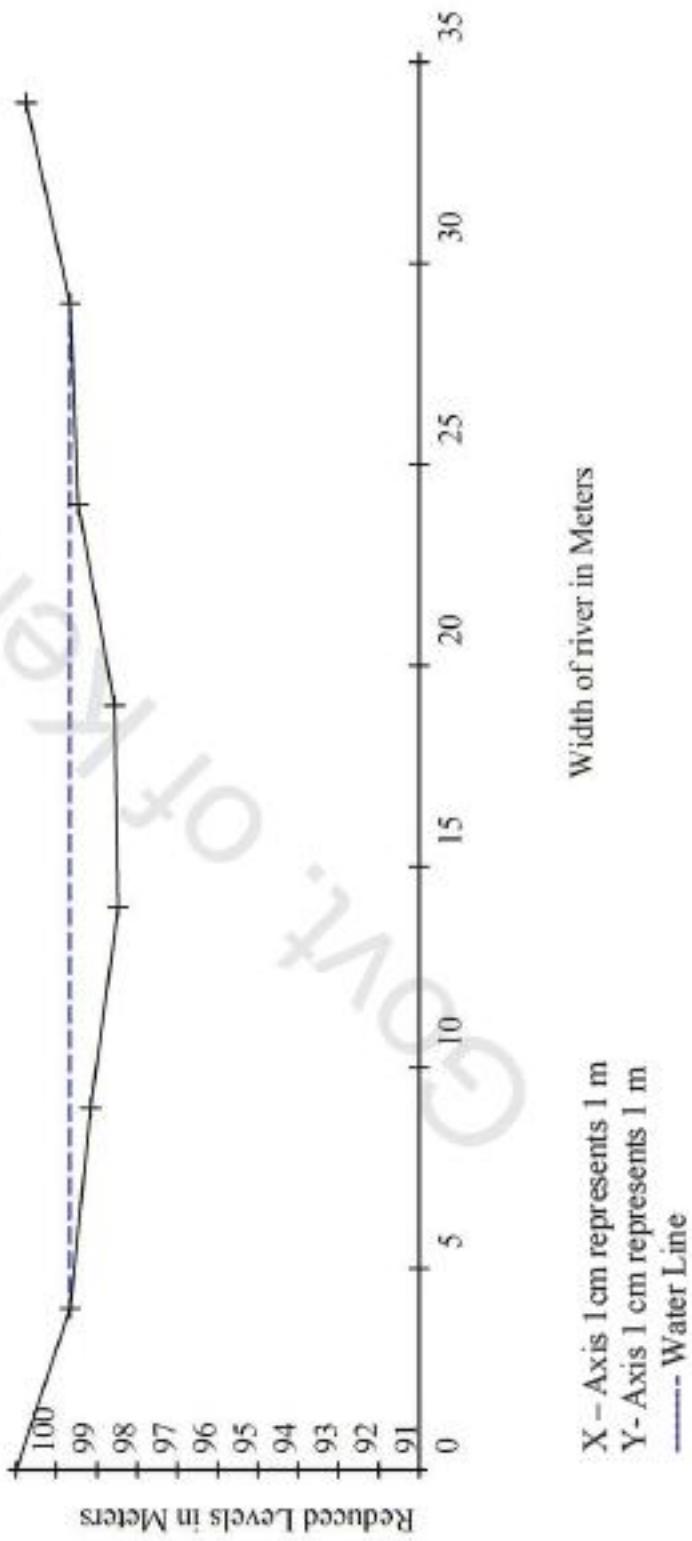
Field book

BS	IS	FS	HI	RL	Remarks	Distance
1.31			101.31	100	BM	0
	2.655			98.655	LBWL	4
	0.5 (3.155)			98.155	WD	9
	1.0 (3.85)			97.46	WD	14
	1.10 (3.75)			97.56	WD	19
	0.20 (2.85)			98.46	WD	24
	2.655			98.655	RBWL	29
				99.745	RBP	34

This river cross-section has taken from 10 north of Mullilavinmoodu thodu which joins Neyyar on left bank. Mullilavinmoodu thodu is the boundary of Kallikkad panchayat and Ottasekharamangalam panchayat Panchayat is taken as the benchmark and is 150 m north of kolangaramoozhi kadavu.



PROFILE - 11
KALLIKKAD GRAMA PANCHAYAT
TBM: Mullawinmoodu Thode joining on the left bank



Profile - 12

Field book

BS	IS	FS	HI	RL	Remarks	Distance
1.22			101.22	100	BM (LB)	0
	3.07			98.15	LBWL	5
	0.30 (3.37)			97.85	WD	10
	1.30 (4.37)			96.85	WD	15
	1.20 (4.27)			96.95	WD	26
	1.10 (4.17)			97.05	WD	25
	0.70 (3.77)			97.45	WD	30
	3.07			98.15	RBWL	35
		1.29		99.33	RBP	43

This river cross-section has taken from Kolangaramoozhi kadavu of Kadambara ward in Ottasekharamangalam panchayat. The road joins the Kolangaramoozhi kadavu on the left bank is taken as the benchmark. The present river cross-section is 150 m south of Mullilavinmoodu thodu.



Govt. of Kerala

Profile – 13

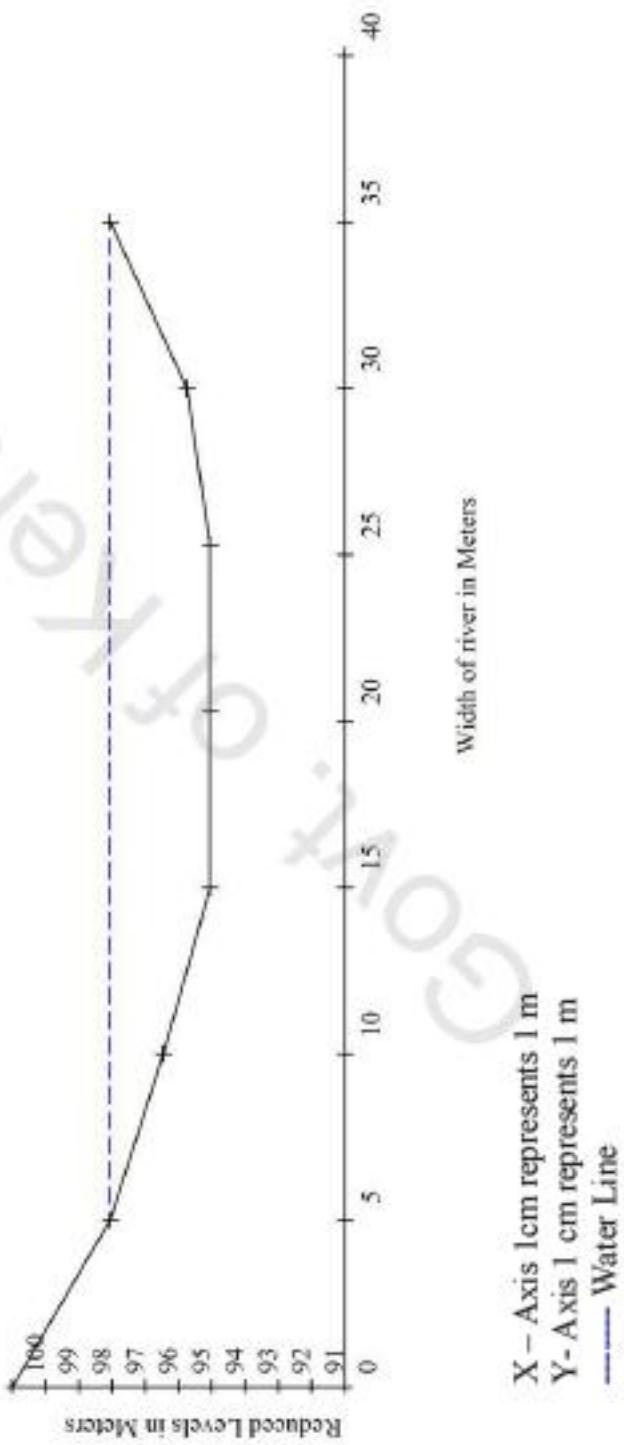
Field book

BS	IS	FS	HI	RL	Remarks	Distance
0.080			100.08	100	BM (RB)	0
	3.02			97.06	RBWL	5
	1.60 (4.62)			95.46	WD	10
	2.80 (5.82)			94.26	WD	15
	3.05 (6.07)			94.01	WD	20
	3.00 (6.02)			94.06	WD	25
	2.30 (5.32)			94.76	WD	30
	3.020			97.06	LBWL	35
		2.670		97.41	RBP	36

This river cross-section has taken from Mannidijanmoola kadvu. The bench mark of the present profile is on the side wall of rubber plantation on the right bank which falls in the Chaikulam ward of Poovachal panchayat.river. Rock exposure is found both in the river and its bank.



PROFILE - 13
POOVACHAL GRAMA PANCHAYAT
TBM: Side wall on the right bank at Mannidjanmoola Kadavu



Profile - 14

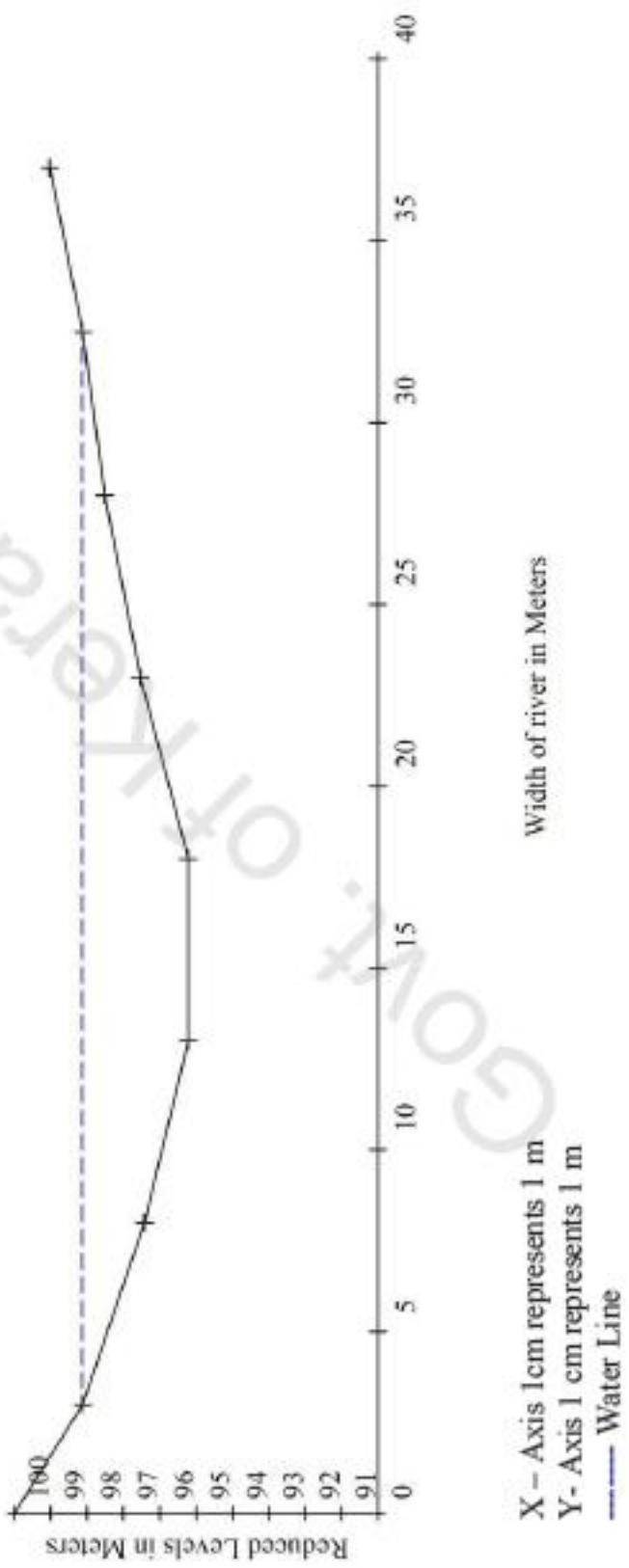
Field book

BS	IS	FS	HI	RL	Remarks	Distance
1.510			101.51	100	BM (RB)	0
	3.390			98.12	RBWL	3
	1.70 (5.09)			96.42	WD	8
	2.90 (6.29)			95.22	WD	13
	2.90 (6.29)			95.22	WD	18
	1.40 (4.79)			96.54	WD	23
	0.60 (3.99)			97.52	WD	28
	3.390			98.12	LBWL	32.5
		2.485		94.025	LBP	37

This river cross-section has taken from Thengivila Kadavu . The bench mark of this profile is on rock exposure on the right bank of the river. The benchmark of the current profile which falls in the Chaikulam ward of Poovachal panchayat.river



PROFILE - 14
POOVACHAL GRAMA PANCHAYAT
TBM: Rock exposure on the right bank at Thenguvila Kadavu



Profile - 15

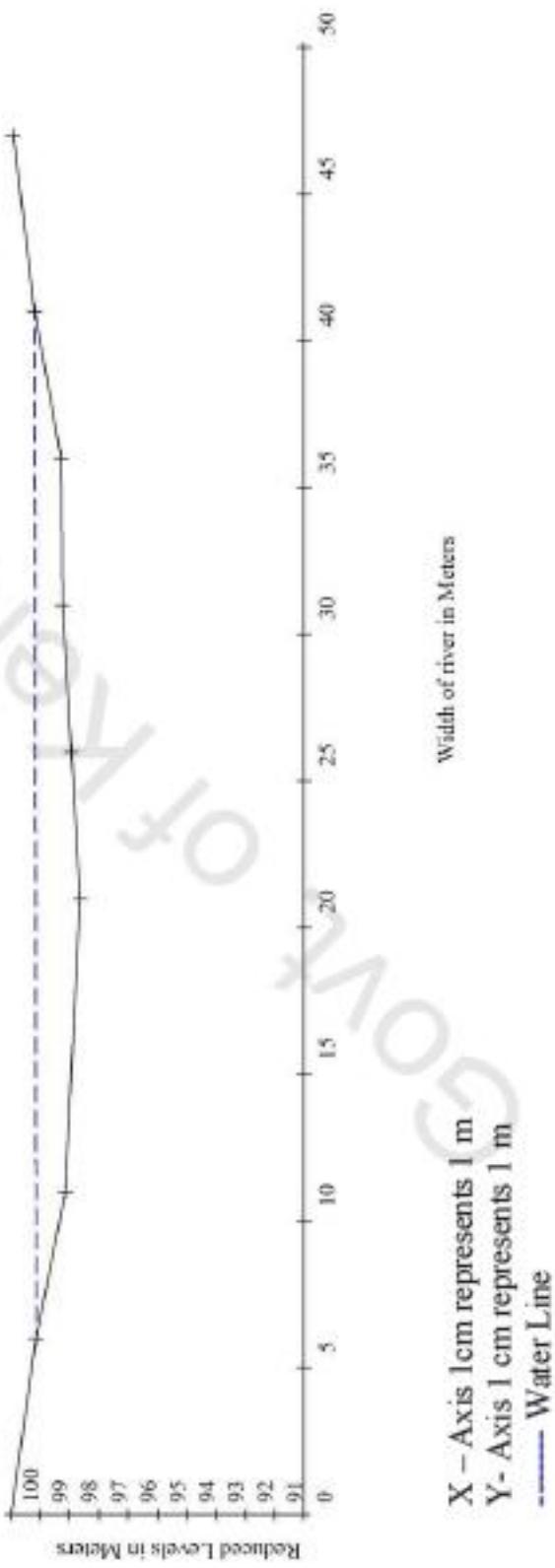
Field book

BS	IS	FS	HI	RL	Remarks	Distance
1.53			101.53	100	BM (RB)	0
	2.39			99.14	RBWL	6
	1 (3.39)			98.14	WD	11
	1.60 (3.99)			97.54	WD	16
	1.50 (3.89)			97.64	WD	21
	1.20 (3.59)			97.94	WD	26
	0.90 (3.290)			98.24	WD	31
	0.90 (3.29)			98.24	WD	36
	2.39			99.14	LBWL	41
		1.61		99.92	LBP	47

This river cross-section has taken from Keppai Kadavu . The bench mark of this profile is on rock exposure on the right bank of the river. The benchmark of the current profile which falls in the Chaikulam ward of Poovachal panchayat. It lies between $08^{\circ}30'20.9''$ N latitude and $077^{\circ}07'104.9.''$ E longitude.



PROFILE - 15
POOVACHAL GRAMA PANCHAYAT
TBM: Rock exposure on the right bank



Profile - 16

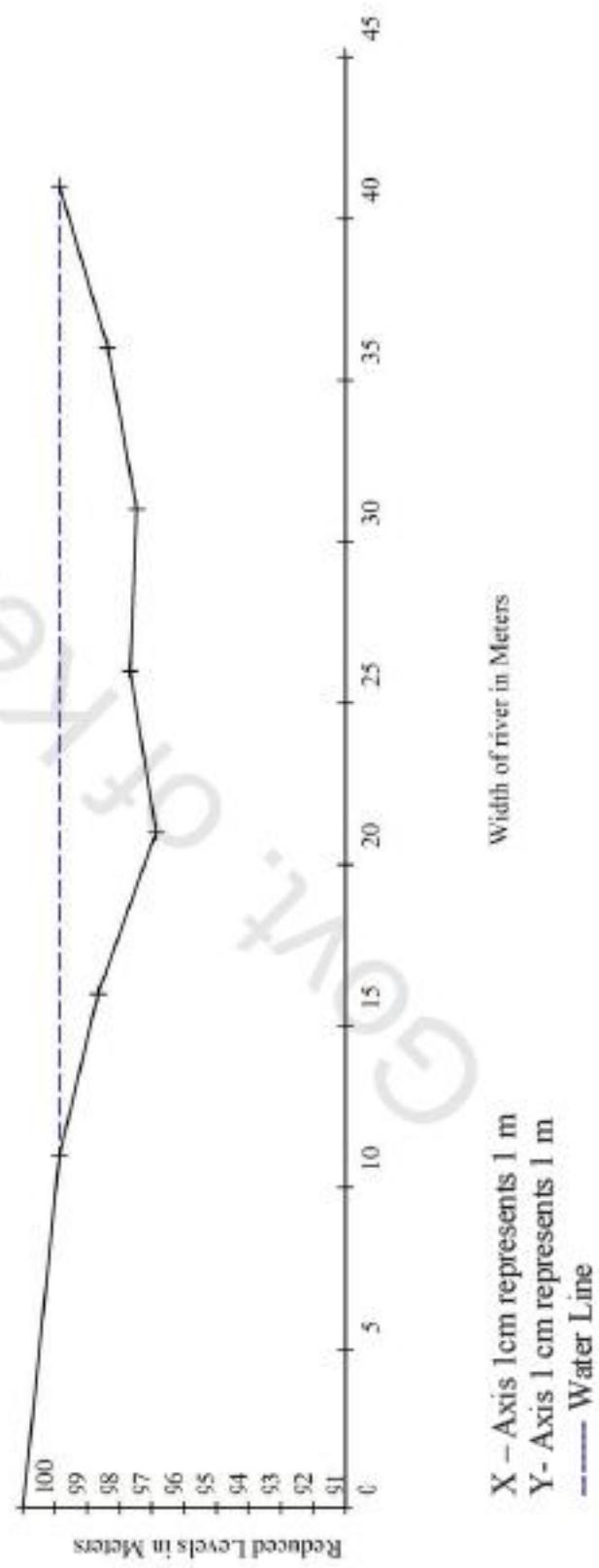
Field book

BS	IS	FS	HI	RL	Remarks	Distance
1.36				100	BM (RB)	0
	2.49			98.87	RBWL	11
	1.20 (3.69)			97.67	WD	16
	3.00 (5.49)			95.87	WD	21
	2.20 (4.69)			96.67	WD	26
	2.40 (4.89)			96.47	WD	31
	1.50 (3.99)			97.37	WD	36
		2.49		98.87	LBWL	41

This river cross-section has taken from Kudimutti Kadavu . The bench mark of the profile is on a survey stone on the right bank of the river. The benchmark of the current profile which falls in the Kattakkada Panchayat. It lies between $08^{\circ}30' 03.8''$ N latitude and $077^{\circ}07' 06.60.''$ E longitude.



PROFILE - 16
KATTAKKADA GRAMA PANCHAYAT
TBM: Survey stone on the right bank



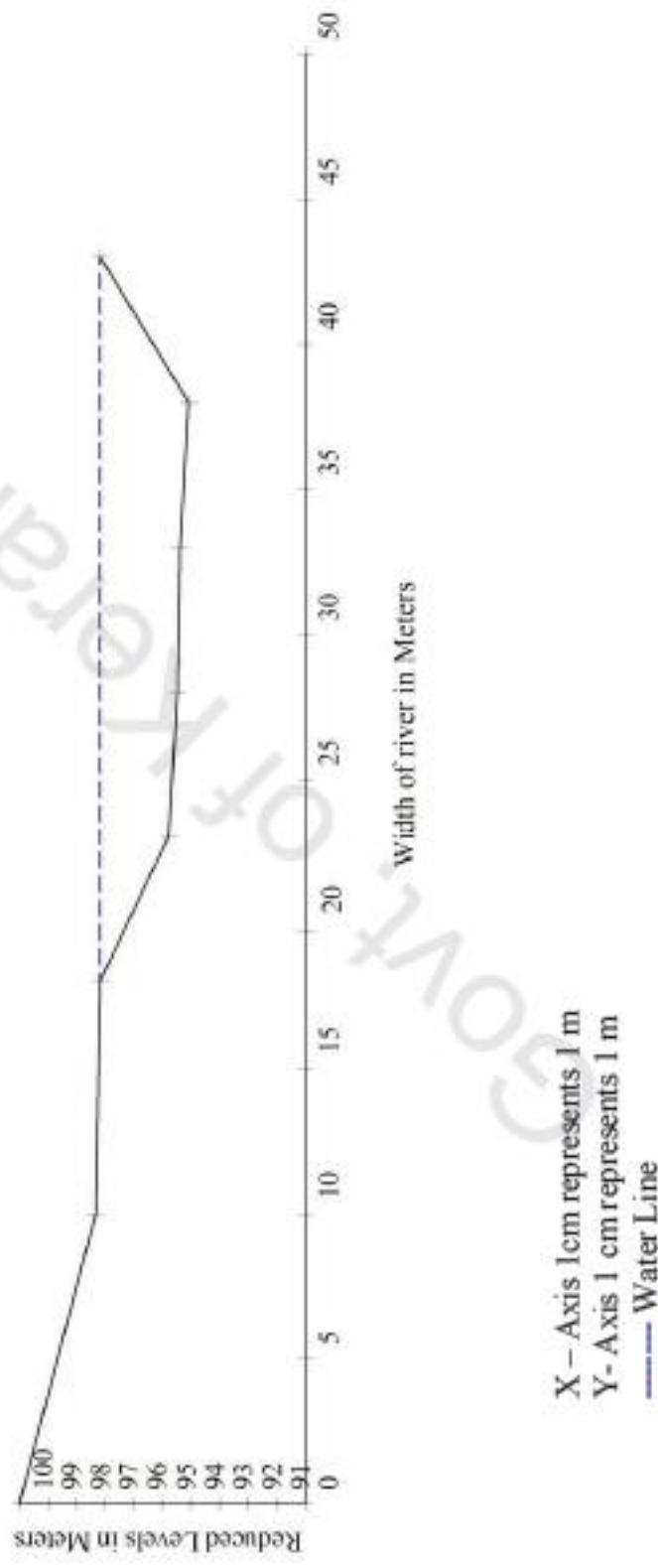
Profile-17
Field book

BS	IS	FS	HI	RL	Remarks	Distance(m)
1.085		3.730	101.41	100	RB(BM)	0
	3.75			97.335	RBP	10
	3.910			97.175	RBWL	18
	2.40 (6.31)			94.775	WD	23
	2.70 (6.61)			94.475	WD	28
	2.80 (6.71)			94.375	WD	33
	3.10 (7.01)			94.075	WD	38
		3.28		97.17	LBWL	43

The present river cross section has taken Thevarucoil. A survey stone close the left bank of the tributary is taken as bench mark. The benchmark falls at the Chandramangalam ward of Kattakkada Panchayat. It lies between $08^{\circ} 29' 49.6''$ N latitude and $077^{\circ} 07' 09.8''$ E longitude.



PROFILE - 17
KATTAKKADA GRAMA PANCHAYAT
TBM: Survey Stone on the Right Bank



Profile-18

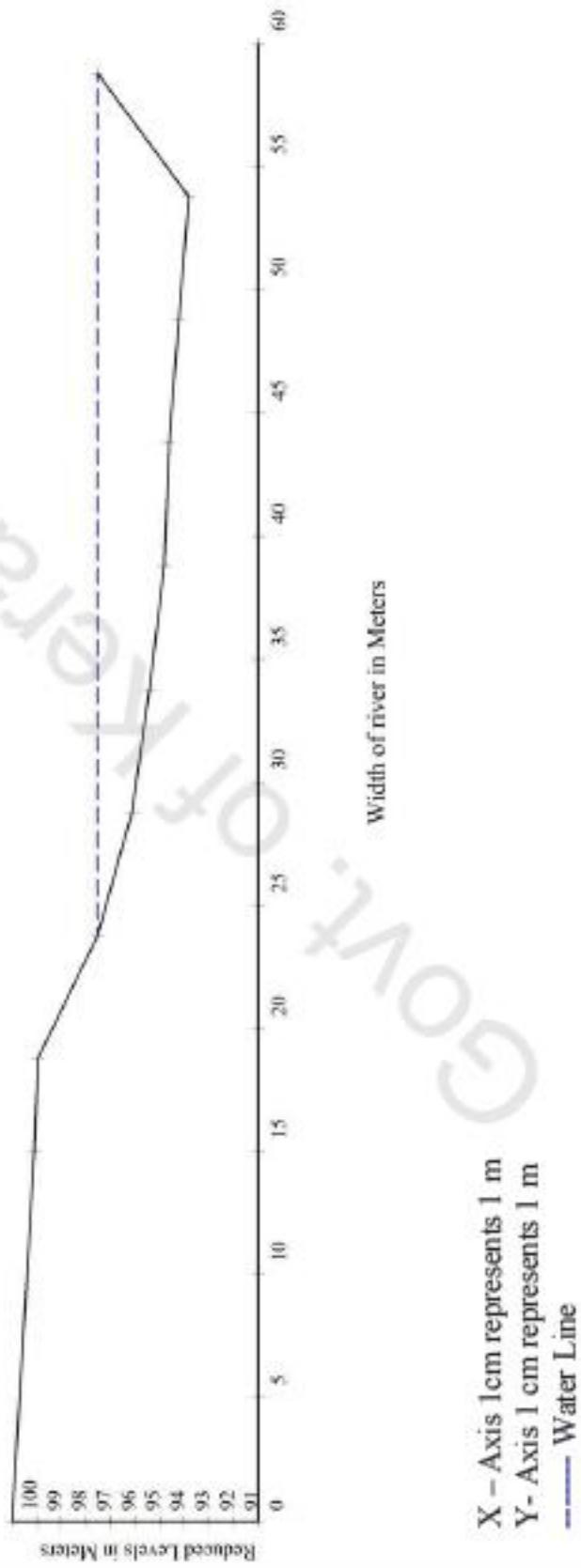
Field Book

BS	IS	FS	HI	RL	Remarks	Distance(m)
1.41			101.41	100	RB(BM)	0
	2.32			99.09	RBP	15
	2.46			98.95	RBP	18.80
	4.88			96.53	RBP	23.80
	1.40(6.28)			95.13	WD	28.80
	2.10(6.98)			94.43	WD	33.80
	2.70(7.58)			93.83	WD	38.80
	2.90(7.78)			93.63	WD	43.80
	3.30 (8.18)			93.23	WD	48.80
	3.70(8.58)			92.83	WD	53.80
		4.88		96.53	LBWL	58.80

The present river cross-section falls at a tributary meeting point of Neyyar on the right bank .This cross-section is 8095.8m downstream of Neyyartadam and lies between 08°29'41.8'' N latitude and 077°07'03.7'' E longitude .The Bench mark is on surveystone at the right bank of the river close to the left bank of the tributary.The takes a sharp bend in this point.



PROFILE - 18
KATTATTAKKADA GRAMA PANCHAYAT
TBM: Survey Stone Near Tributary Joining at the Right Bank



X - Axis 1cm represents 1 m
Y- Axis 1 cm represents 1 m
— Water Line

Profile-19

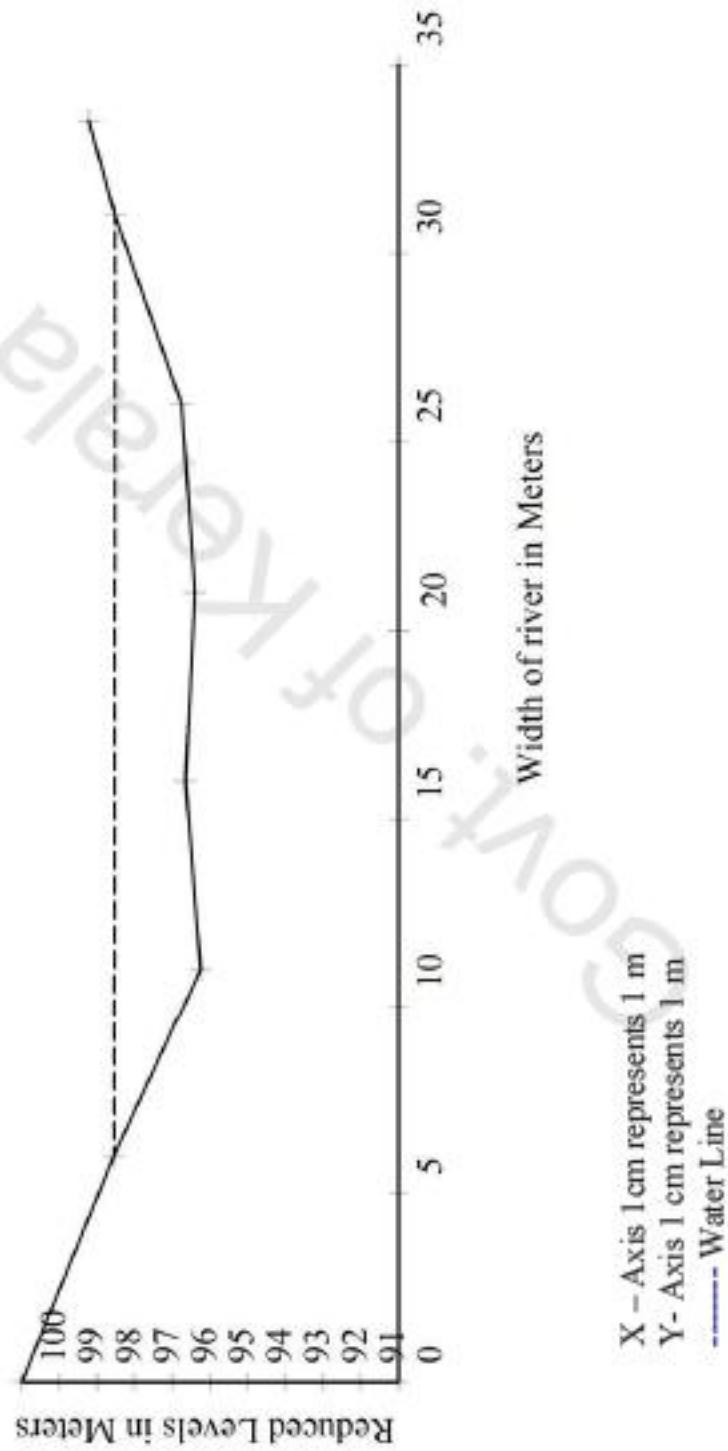
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
.115			100.115	100	RBP	0
	2.56			97.55	RBWL	6
	2.30(4.86)			95.25	WD	11
	1.90(4.460)			95.65	WD	16
	2.40(4.7)			95.41	WD	21
	1.80(4.36)			95.75	WD	26
	2.56			97.525	LBWL	31
		1.89		98.22	LBP	33.5

The current river cross-section falls at the Nilamannadikadavu of Ottasekharamangalam Grama panchayat. It lies between 08°29'42.6" N latitude to 77°07'15.1"E longitude .The side wall of the kadavu on the left bank is taken as Benchmark which is 8423m downstream of Neyyar Reservoir Bridge.



PROFILE - 19
OTTASEKHARAMANGALAM GRAMA PANCHAYAT
TBM: Side wall constructed on the left bank at Nilamannikadavu



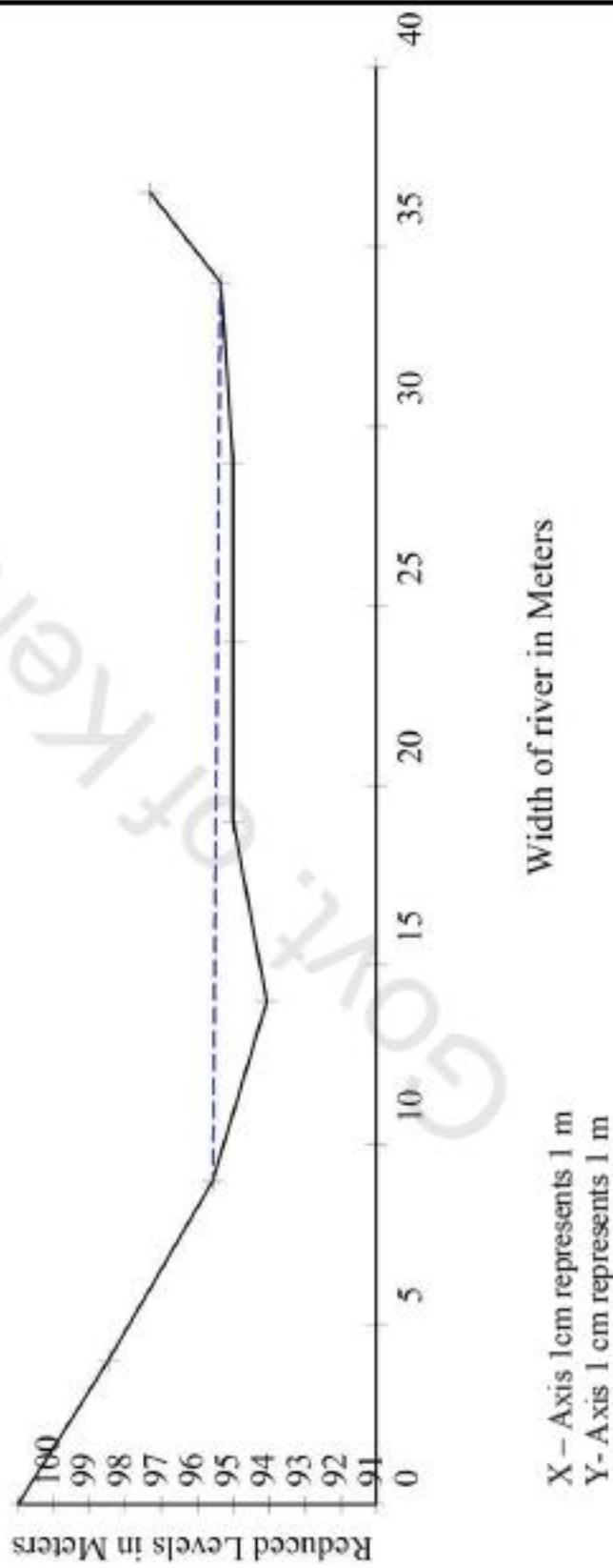
Profile-20
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.45			101.45	100	RBP	0
	3.965			97.485	RBP	4
	4.295			97.155	RBWL	9
	1.50(5.795)			95.655	WD	14
	.90(4.865)			96.585	WD	19
	.90(4.865)			96.585	WD	24
	.90(4.865)			96.585	WD	29
	4.295			97.155	LBWL	34

The current river cross-section has taken from 100m north of Mandapathinkadavu Bridge. The bench mark of the present profile is on parapet of water tank of Kerala Water Authority in Ottasekharamangalam Gramapanchayat on the left bank. It lies between 08°29'42.6'' N latitude to 77°07'15.1''E longitude.



PROFILE - 20
OTTASEKHARAMANGALAM GRAMA PANCHAYAT
TBM: Parapet of Water Tank (KWA) on the Left Bank.



Profile-21

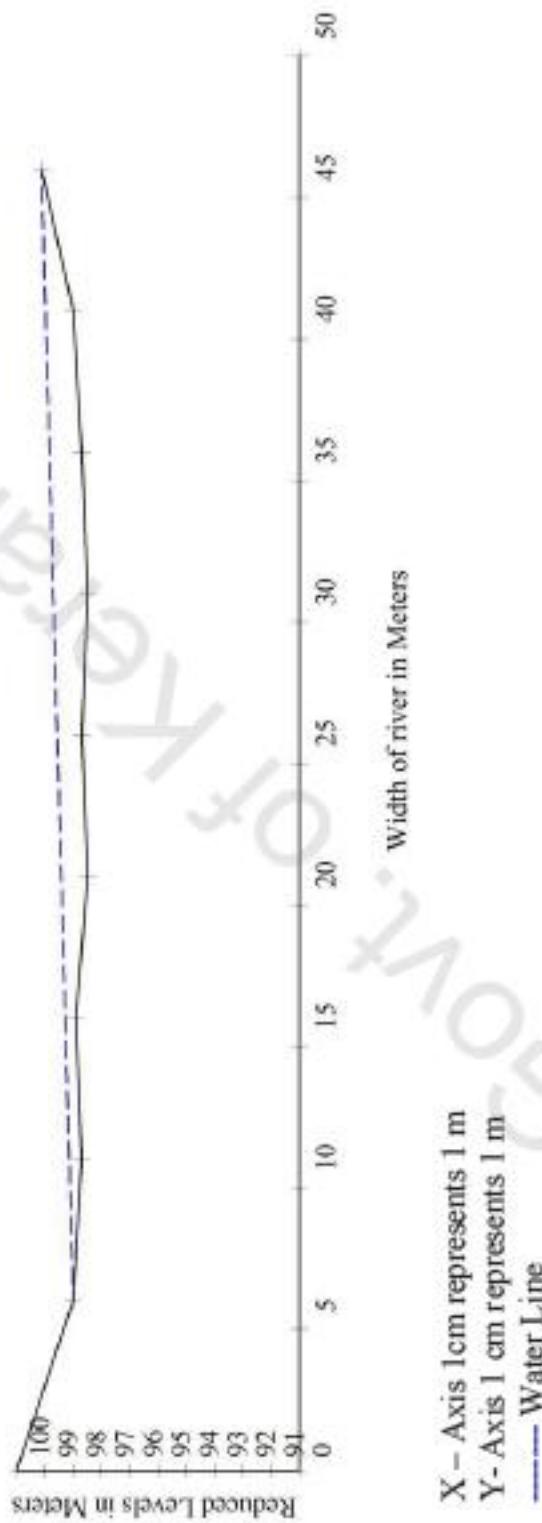
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.70			101.7	100	LB (BM)	0
	3.70			98.0	LBWL	6
	.30(4.0)			97.7	WD	11
	.10 (3.80)			97.9	WD	16
	.50 (4.20)			97.5	WD	21
	.30(4)			97.7	WD	26
	.50(4.20)			97.5	WD	31
	.30(4.0)			97.7	WD	36
	3.70			98.0	WD	41
		2.580		99.12	RBWL	46

This river cross-section has taken from south of Mandapathinkadavu Bridge. The bench mark of the present profile is on the protection wall which falls in the Kuravara ward of Ottasekhaamangalam panchayat. It lies between $08^{\circ} 29' 27.2''$ N latitude and $077^{\circ} 07' 09.28.3$ E longitudes.



PROFILE - 21
OTTASEKHARAMANGALAM GRAMA PANCHAYAT
TBM: Concrete side wall constructed near kadavu on the left bank



X - Axis 1 cm represents 1 m
Y - Axis 1 cm represents 1 m
— Water Line

Profile-22

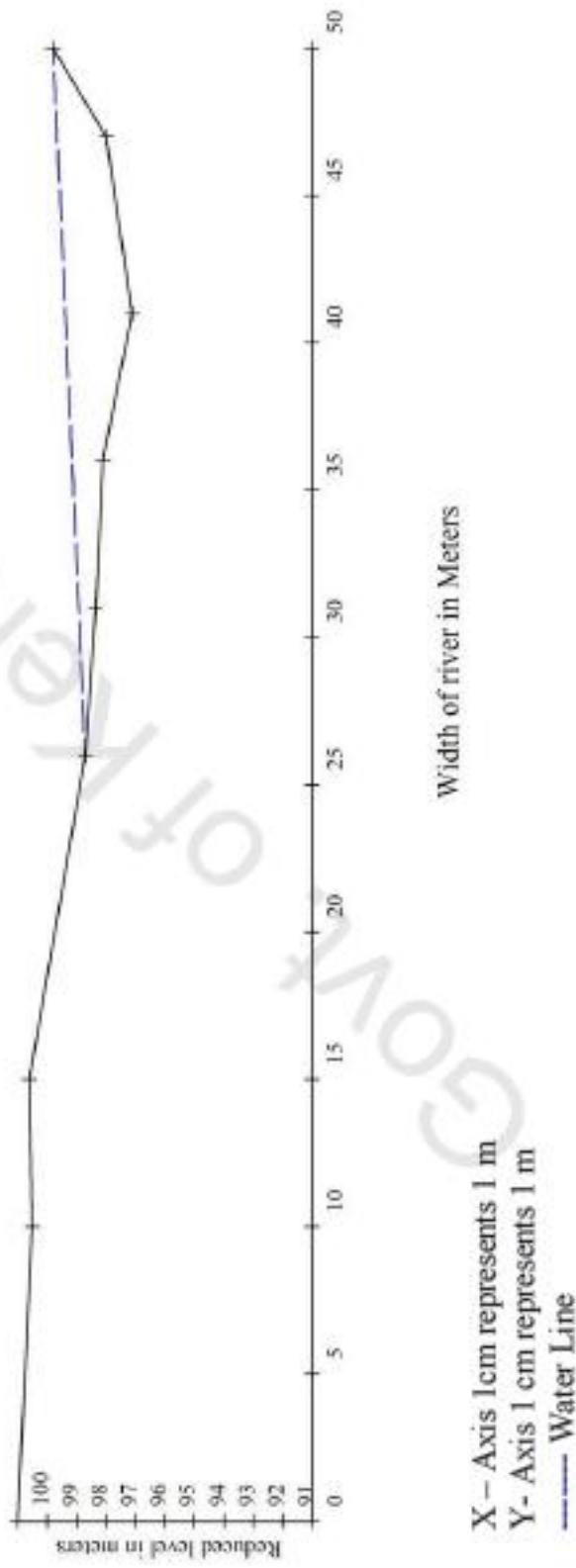
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.41			100.41	100	RBP	0
0.0		0.90		99.51	RBP(cp ₁)	10 m
0.13		0.13		95.91	RBP(cp ₂)	15
4780		2.70		97.71	RBP(cps)	26
	.35(5.13)			95.28	WD	31
	.60(5.38)			95.03	WD	36
	11.00(5.78)			94.63	WD	41
		2.730		97.68	LBWE	46

The current river cross-section falls at the Mailakkara kadavu of Aryancode Grama panchayat. It lies between 08°28'24.5" N latitude to 77°07'15"E longitude. The benchmark of this river cross section is on a survey stone on the left bank.



PROFILE -22
KATTAKKADA GRAMA PANCHAYAT
TBM: Back corner of House (No.480)



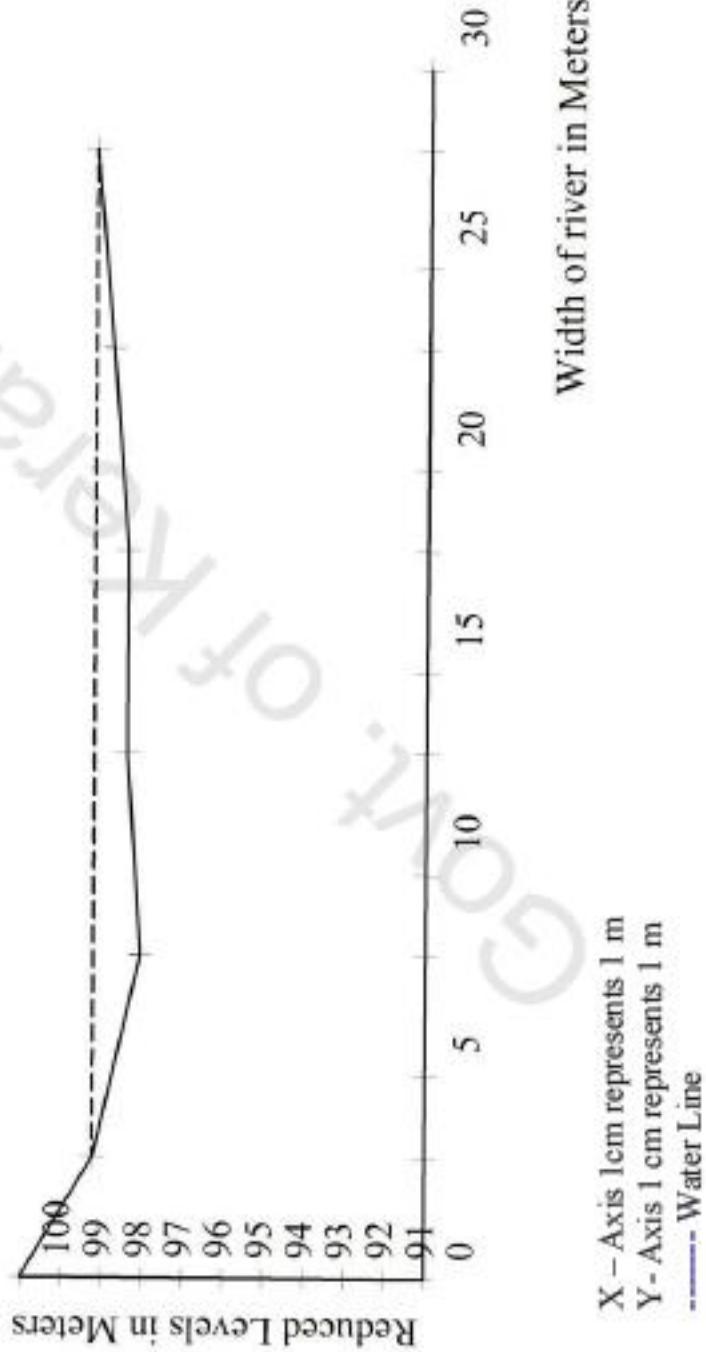
Profile-23
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.460			100.46	100	RBP	0
	2.245			98.215	RBWE	3
	1.15(3.395)			97.065	WD	8
	.80(3.045)			97.415	WD	13
	.80(3.045)			97.415	WD	18
	.40(2.645)			97.815	WD	23
		2.20		98.26	LBWE	28

The current river cross-section falls at 10361 m downstream of Neyyar Reservoir bridge .It lies between 08°29'19.6'' N latitude to 77°07'17.3'' E longitude .The rock exposure on the left bank is taken as Benchmark . The bench mark falls at Kuravara ward of Ottasekharamangalam Gramapanchayat.



PROFILE - 23
OTTASEKHARAMANGALAM GRAMA PANCHAYAT
TBM: Rock exposure on the left bank



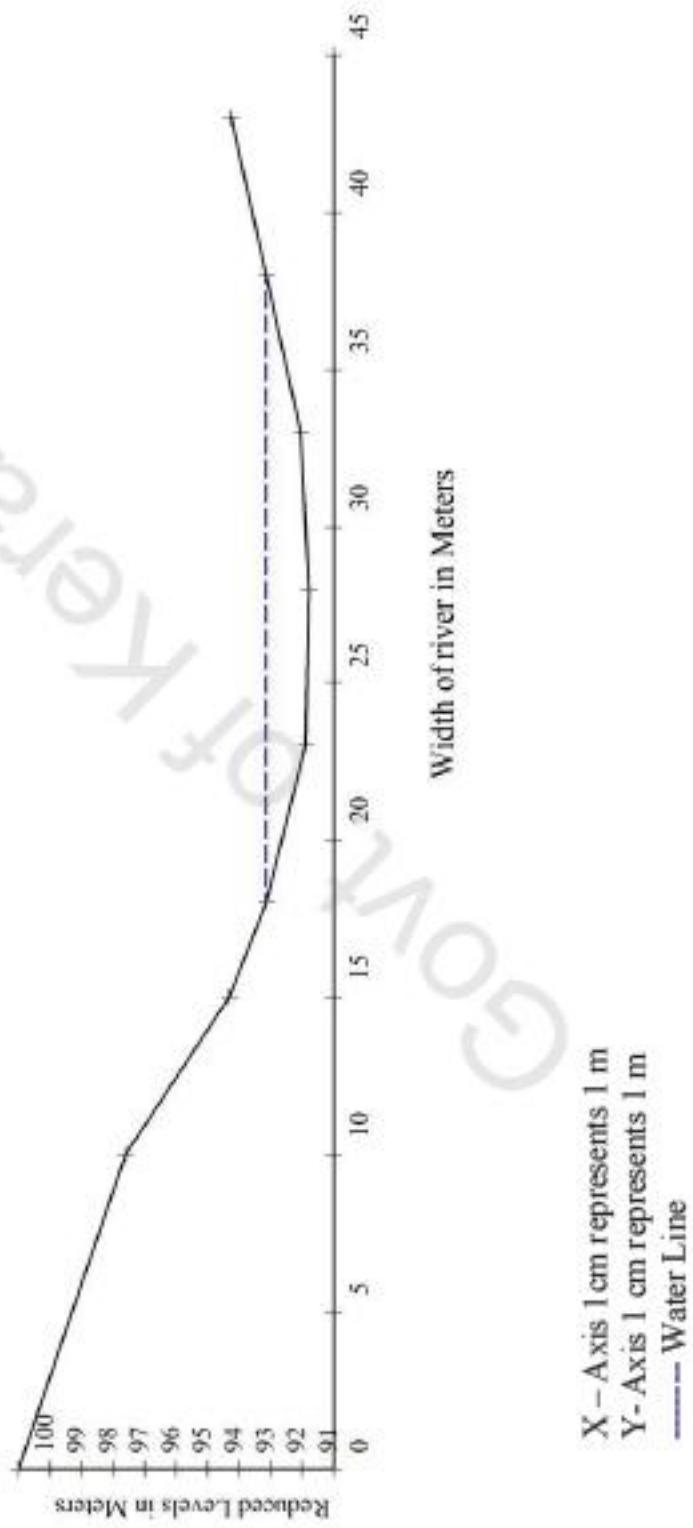
Profile-24
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.205			101.205	100	LBP	0
0.645		4.60	97.25	96.605	LBP	10
1.12		3.94	94.43	93.31	LBP	15
	2.29			92.14	LBWE	18
	1.25(3.54)			90.89		23
	1.35(3.64)			90.79		28
	1.10(3.39)			91.04		33
	2.29			92.14		38
		1.17		93.26		43

The current river cross-section falls at Venkanni kadavu which is 340 south of the previous profile. It lies between 08°29'07.9'' N latitude to 77°07'22.9''E longitude .The protection wall the right bank is taken as Benchmark . The bench mark falls at Kattakkada Gramapanchayat.



PROFILE - 24
KATTAKADA GRAMA PANCHAYAT
TBM; Side wall constructed on the right bank



Profile-25

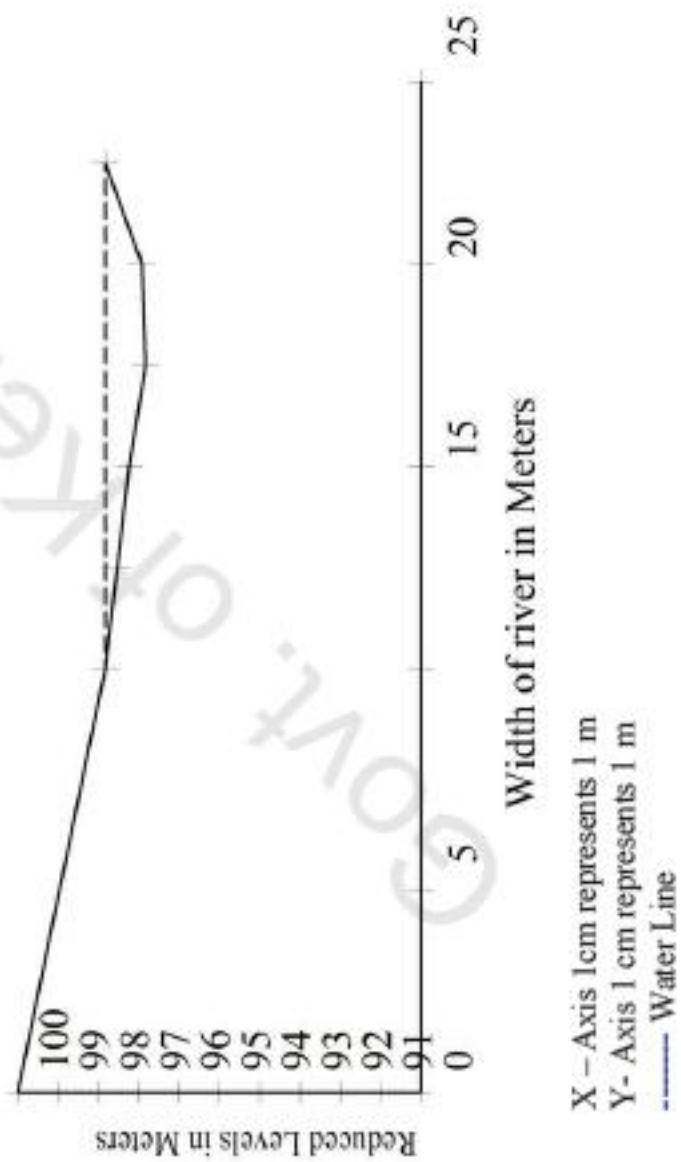
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
	35 BM		101.12	100	LBP	0
1.12				97.83	LBWL	10.5
	3.29			97.53		13
	.30(3.59)			97.23		15.5
	.60(3.89)			96.83		18
	1.00(4.29)			96.93		20.5
	.90(4.19)			97.83		23
		3.29				

The current river cross-section has taken from Parakkadavu. The Bench mark is marked on the protection wall. It lies between 08°29'072.6'' N latitude to 77°07'26''E longitude. The bench mark falls at Kuravara ward of Ottasekharamangalam Gramapanchayat.



PROFILE - 25
OTTASEKHARAMANGALAM GRAMA PANCHAYAT
TBM: Side wall constructed on the left bank



Profile-26

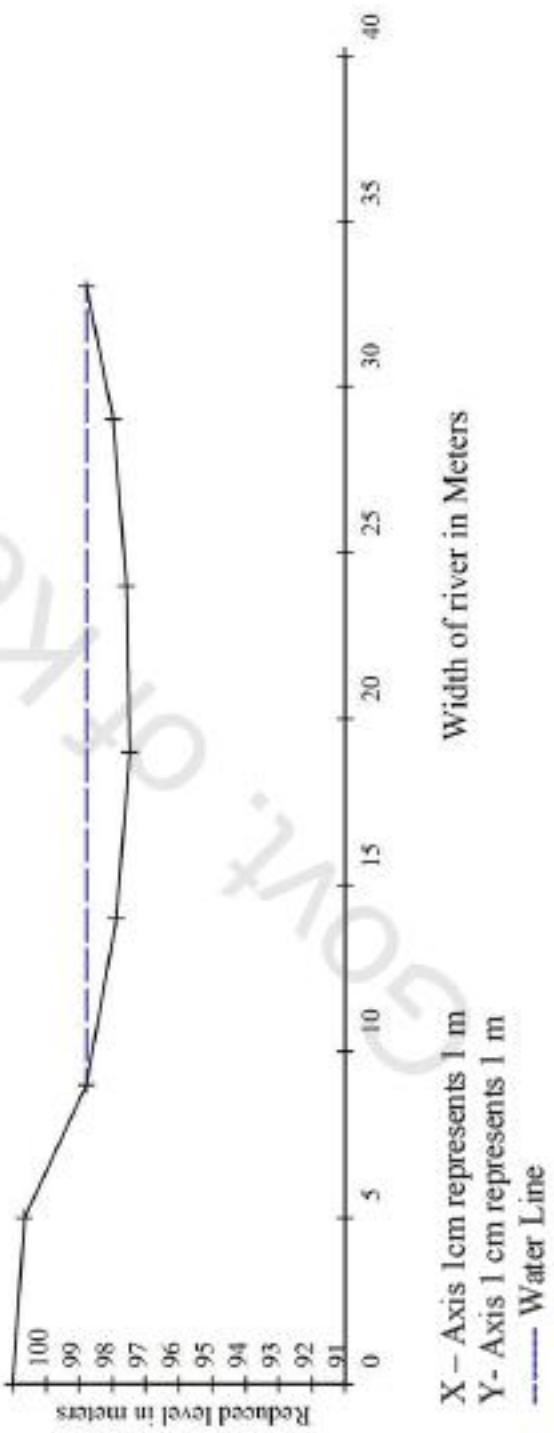
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.575			100.57	100	LB (BM)	0
	0.92			99.65	LBP	5
	2.79			97.78	LBWL	9
	.90(3.69))			96.88	WD	14
	1.3 (4.09)			96.48	WD	19
	1.2(3.99)			96.58	WD	24
	.80(3.59)			96.98	WD	29
		2.79		97.78	RBWL	33

This river cross-section has take from Parakkadavu.. The bench mark of the present profile is on the rock exposure on the left bank which falls in the Kuravara ward of Ottasekhaamangalam panchayat. It lies between $08^{\circ} 28' 43.2''$ N latitude and $077^{\circ} 07' 28.0$ E longitudes.



PROFILE-26
OTTASEKHARAMANGALAM GRAMA PANCHAYAT
TBM: Rock exposure on right bank at Parakkadavu



Profile-27

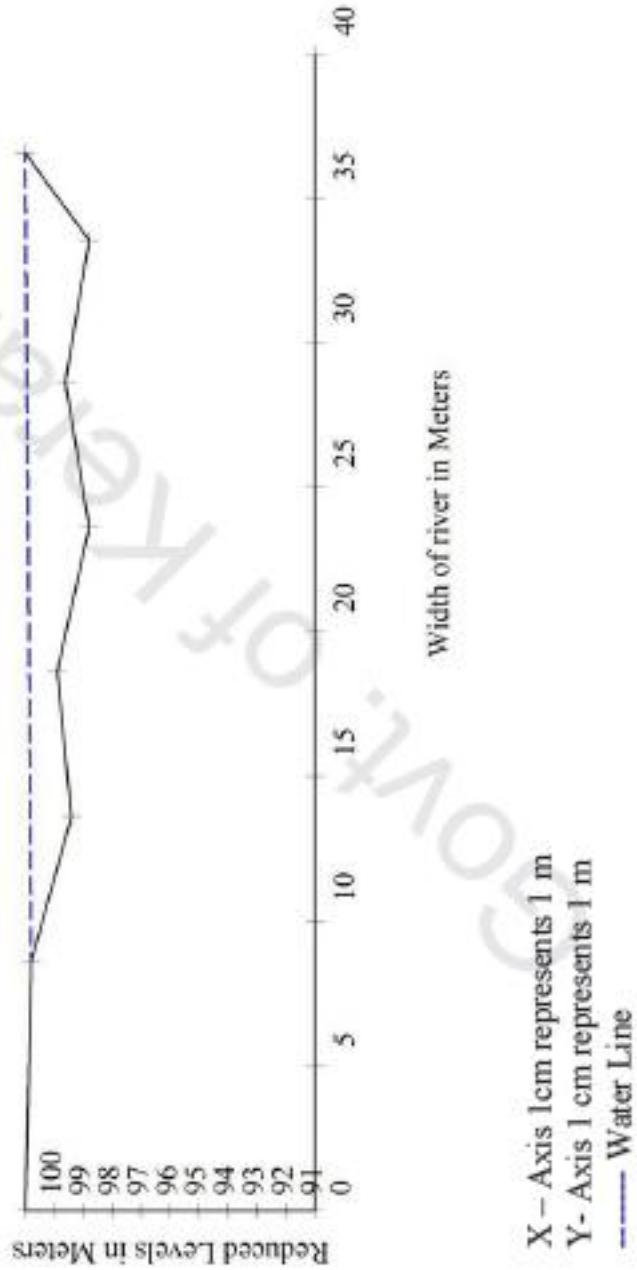
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
2.595		1.83	102.595	100	LBP	0
	2.03		101.83	98.8	LBWE	8.6
	1.40(3.43)			98.4	WD	13.6
	.90(2.93)			98.9	WD	18.6
	2.00(4.03)			97.8	WD	23.6
	1.14			98.66	WD	28.6
	1.98(4.01)			97.82	RBWE	33.6
	1.60			100	RBP	34.6
		0.625		101.97	RBP	36.6

The current river cross-section falls at the Munattu Mukku of Aryan code Grama panchayat. It lies between 08°28'33.9" N latitude to 77°07'15"E longitude. The benchmark of this river cross section is on the protection wall on the right bank. A water tank of KWA is located on the right bank.



PROFILE - 27
KATTAKKADA GRAMA PANCHAYAT
TBM: Protection wall constructed on the right bank at Munnattumukku



Profile-28

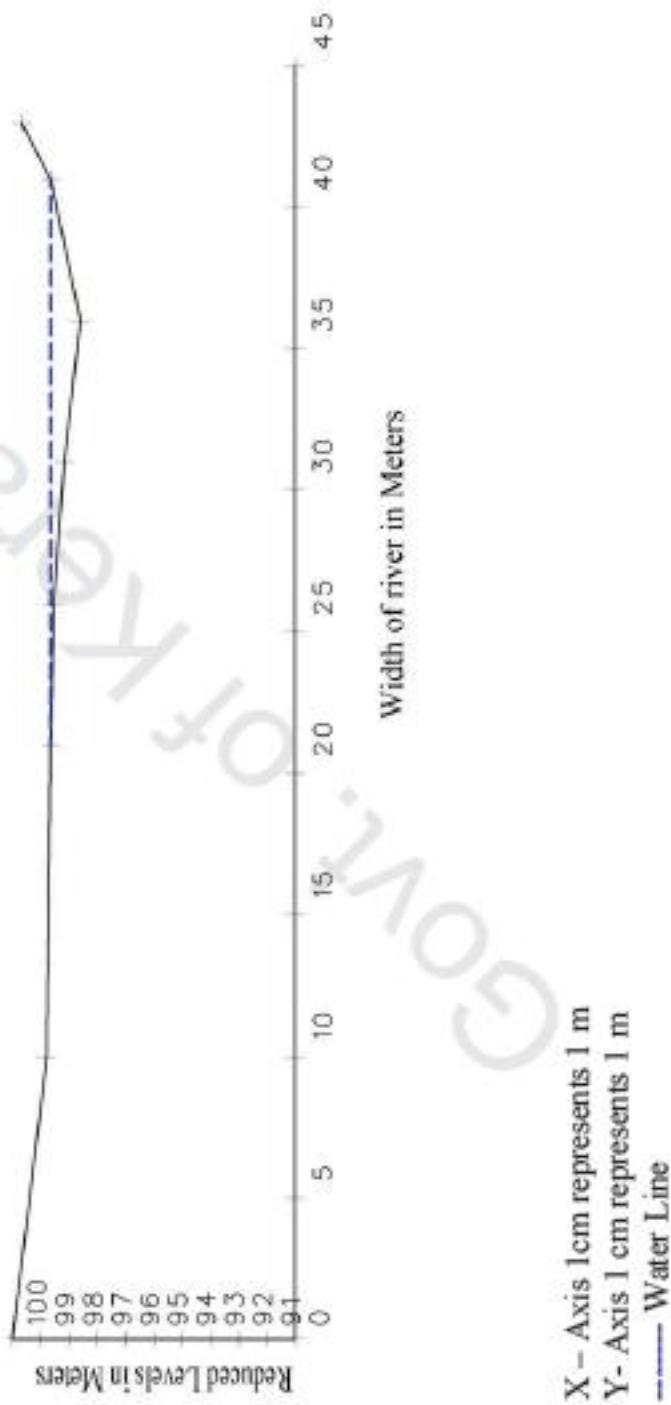
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.67			100.67	100	LBP(BM)	0
	1.875			98.795	LBP	10
	2.02			98.65	LBWL	21
	.10(2.12)			98.55	WD	26
	.50(2.5)			98.17	WD	31
	1.05(3.07)			97.6	WD	36
	2.02			98.65	RBWL	41
		.99		99.68	RBP	43

The current river cross-section falls at the Kukkidimoola kadavu of Aryancode Grama panchayat. It lies between 08°28'24.4." N latitude to 77°07'28.3"E longitude. The benchmark of this river cross section is the meeting point of Kukkidi Ar on the left bank



PROFILE - 28
ARYANCODE GRAMA PANCHAYAT
TBM: Kukkidi Ar. joining on the left bank at Kukkidimoola



Profile-29

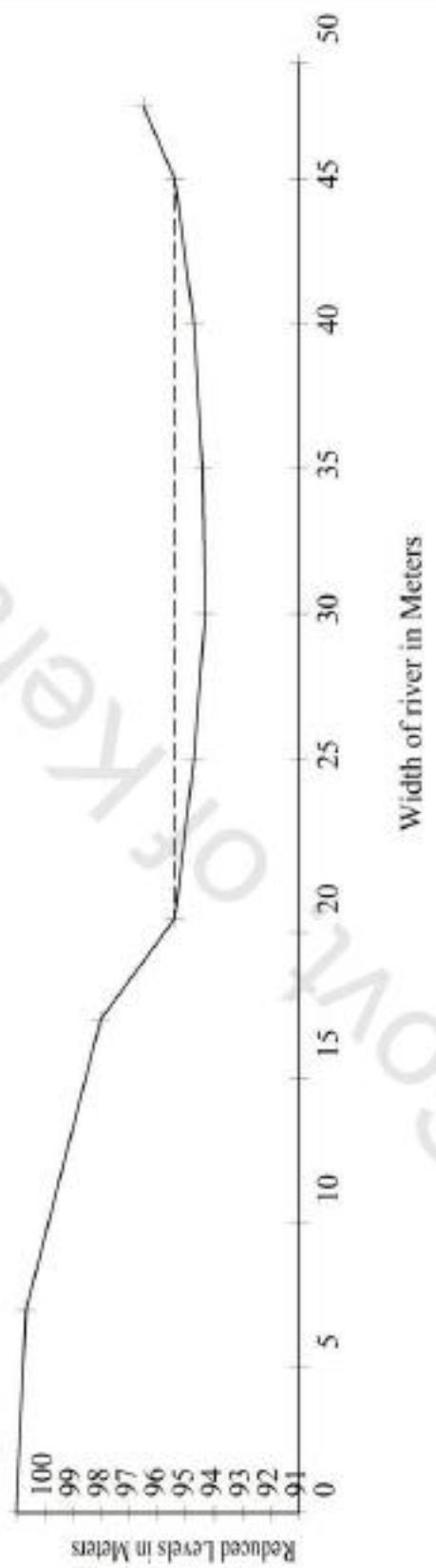
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.845			100.845	100	LB	0
	2.26			99.66	LBP	7
	4.895			97.025	LBP	17
3.56				94.39	LBP	20.5
	1.82			94.41	LBWL	21
	.70(2.52)			93.71	WD	26
	1.10(2.92)			93.31	WD	31
	1.00(2.82)			93.41	WD	36
	.7(2.52)			93.71	WD	41
	1.82			94.39	RBWL	46
		.73		95.5	RBP	48.5

The current river cross-section falls at the Mailakkara kadavu of Aryancode Grama panchayat. It lies between 08°28'24.5" N latitude to 77°07'15"E longitude. The benchmark of this river cross section is on a survey stone on the left bank.



PROFILE - 29
ARYANCODE GRAMA PANCHAYAT
TBM: Survey Stone on the left bank at Mylakkarakadu



Profile-30

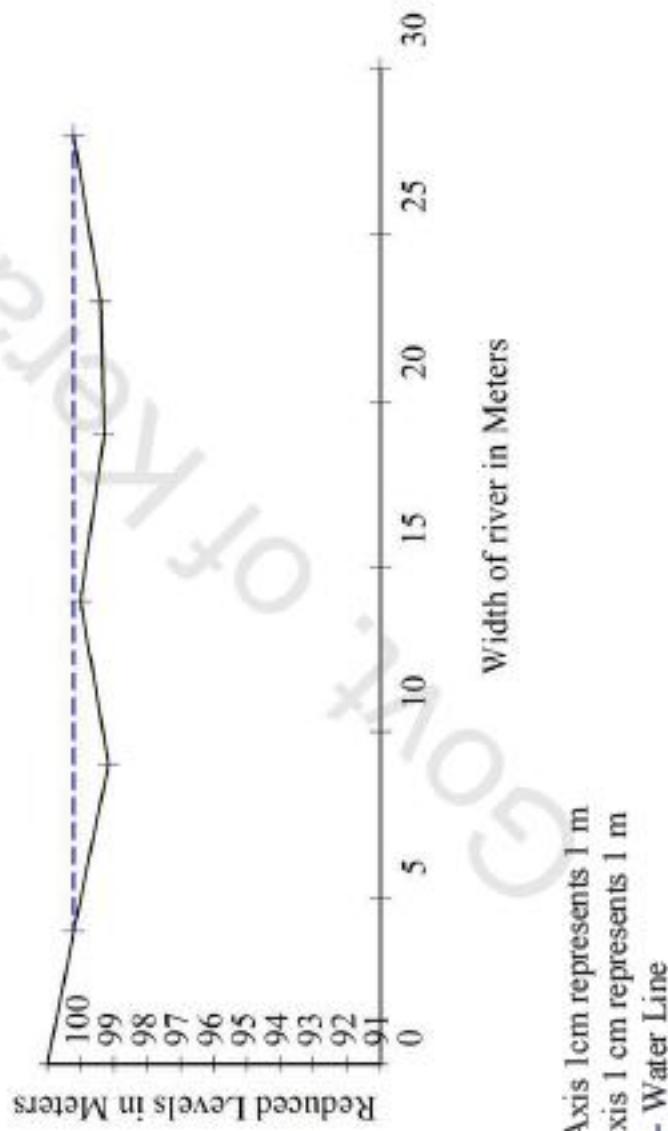
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.80			100.8	100	BS(LBP)	0
	1.59			99.21	LBWL	4
	.50(2.09)			98.71	WD	9
	.20(1.79)			99.01	WD	14
	.90(2.49)			98.31	WD	19
	.80(2.39)			98.41	WD	23
		1.59		99.21	RBWL	28

The current river cross-section falls at Pozhiyalloor Mahavishnu temple Kadavu. It lies between 08°28'28.2" N latitude to 77°06'17.3"E longitude. The protection wall of Kadavu on the left bank is taken as Benchmark and is falls on Aryancode Gramapanchayat.



PROFILE - 30
ARYANCODE GRAMA PANCHAYAT
TBM: Protection wall on the left bank at Pozhiyallur Mahavishnu Temple Kadavu



Profile-31

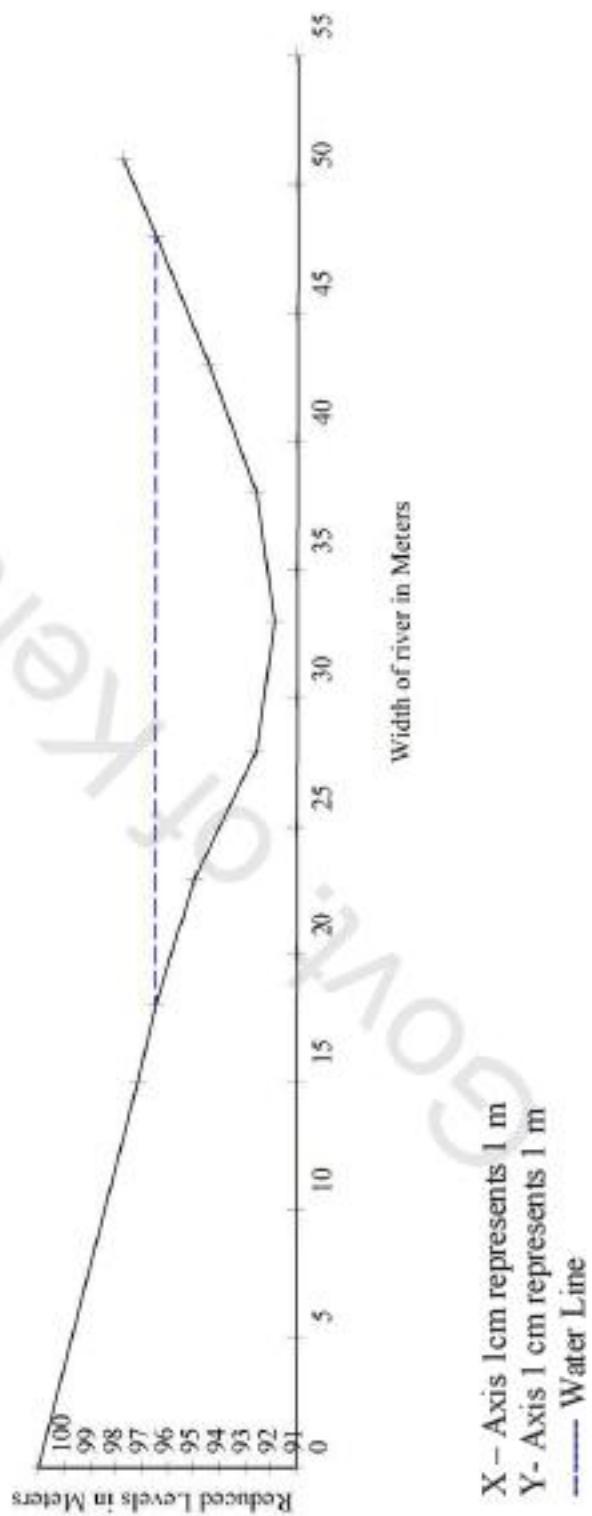
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.81			100.81	100	LBP	0
0.975			97.125	96.15	LBP	15
	1.69			95.455	LBWL	18
	1.60(3.29)			93.925	WD	23
	3.90(5.59)			91.535	WD	28
	4.60(6.29)			90.835	WD	33
	3.90(5.59)			91.535	WD	38
	2.10(3.84)			93.285	WD	43
	1.69			95.435	RBWL	48
		0.36		96.765	RBWL	51

This river cross-section has taken from 642 m south of Pozhiyanalloor Mahavishnu temple kadavu. This cross section is the meeting point of Machayil thodu to the Neyyar. Joining point is taken as the benchmark which falls in Aryancode Gramapanchaayat. It lies between 08°28'15.7.'' N latitude to 77°06'51.9.'' E longitude.



PROFILE - 31
ARYANCODE GRAMA PANCHAYAT
TBM: Machayil Thode joining Neyyar at the left bank



Profile-32

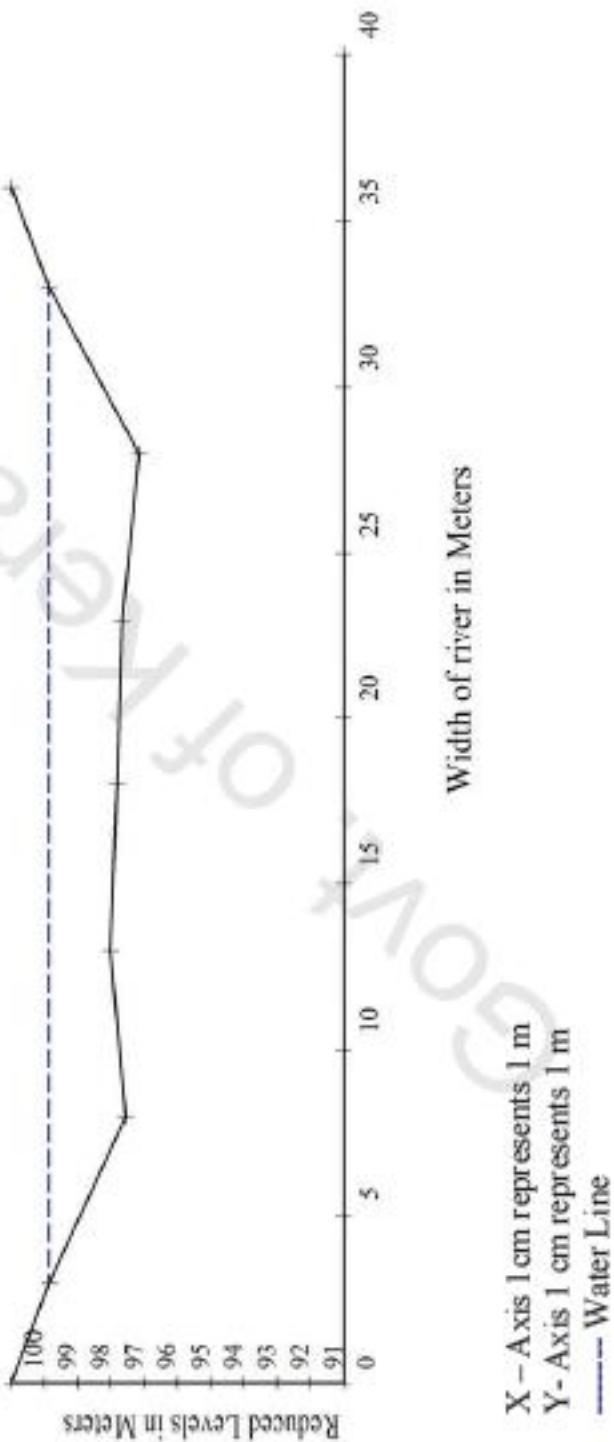
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.085			101.085	100	RBP(BM)	
	2.22			98.865	RBWL	3
	2.30(4.52)			96.565	WD	8
	1.85(4.07)			97.015	WD	13
	2.05(4.27)			96.815	WD	18
	2.20(4.42)			96.665	WD	23
	2.71(4.93)			96.155	WD	28
	2.22			98.865	LBWL	33
		1.06		100.025	LBP	36

This river cross section has taken from Keezharoor kadavu. Protection wall of Kadavu on the left bank is taken as benchmark which falls in Aryancode Gramapanchayat. It lies between $08^{\circ}28'12.2''$ N latitude to $77^{\circ}06'38.3''$ E longitude.



PROFILE - 32
KATTAKKADA PANCHAYAT
TBM: Protection wall constructed near KWA Pump House at Keezharoor kadavu



Profile-33

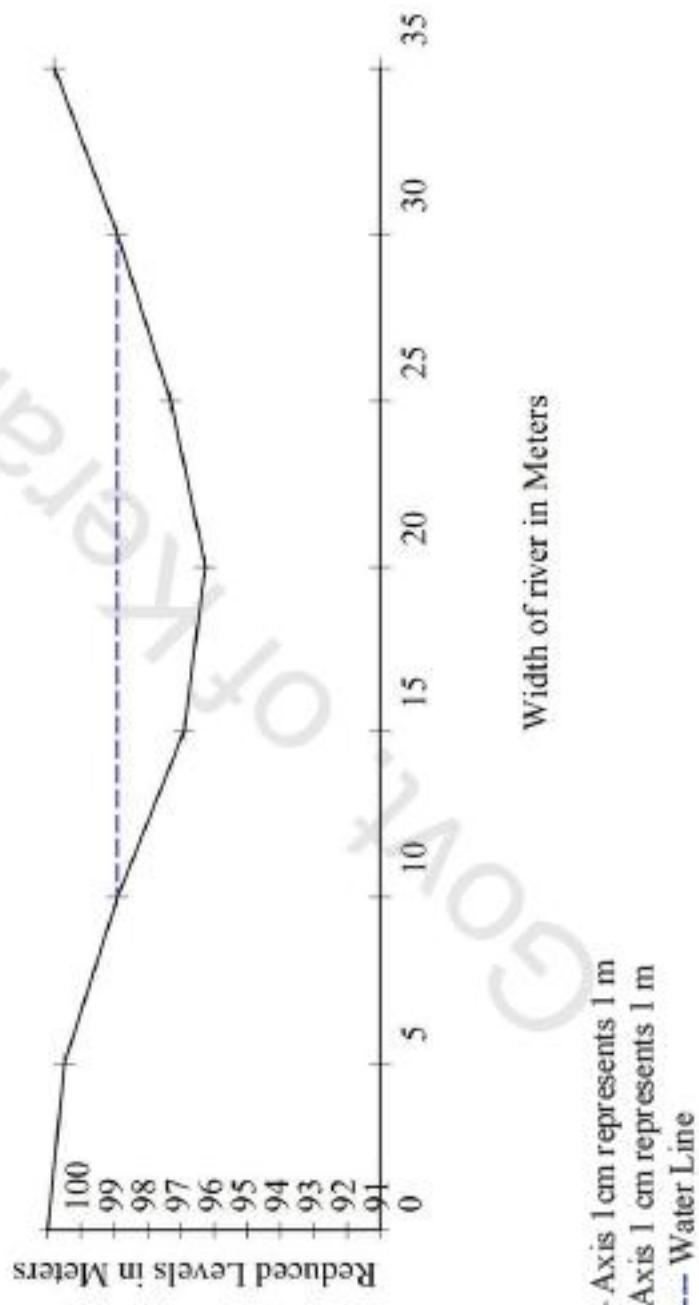
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.10			100.1	100	RMLB	
	0.60			99.5	LB	5
	2.19			97.91	LBWL	10
	2.0(4.19)			95.91	WD	15
	2.65(4.84)			95.26	WD	20
	1.06(3.79)			96.31	WD	25
		2.19		97.91	RBWL	30

The present river cross-section has taken from Madathurai kadvu. The bench mark is marked on the rock exposure close to the kadavu which is in the Keezharoor ward of Aryancode Panchayat on the left bank. It lies between 08°29'10.7" N latitude to 77°06'32.4"E longitude.



PROFILE - 33
ARYANCODE GRAMA PANCHAYAT
TBM: Rock exposure on the left bank at Madathurai Kadavu



Profile-34

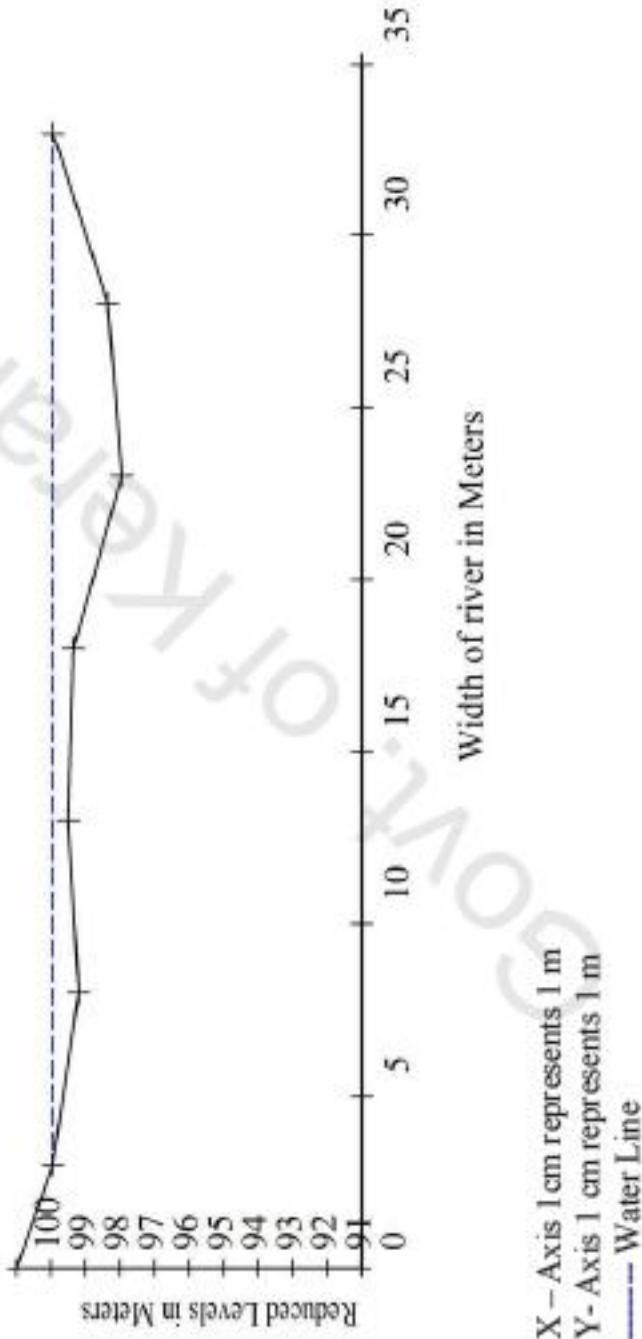
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.625			100.625	100	BMLBP	0
	1.67			98.955	LBWL	3
	.75(2.42)			98.205	WD	8
	.45(2.12)			98.505	WD	13
	.60(2.27)			98.355	WD	18
	2.00(3.67)			96.955	WD	23
	1.67(3.27)			97.355	WD	28
		1.67		98.955	RBWL	33

The present river cross-section has taken from Kuttillattum Kadavu. The bench mark established here is on the rock exposure on left bank which is in Aryancode Gramapanchayat..It lies between 08°28'10.3" N latitude to 77°06'21.2"E longitude.



PROFILE - 34
ARYANKODE GRAMA PANCHAYAT
TBM: Rock exposure on the left bank at Kootttilattam kadavu

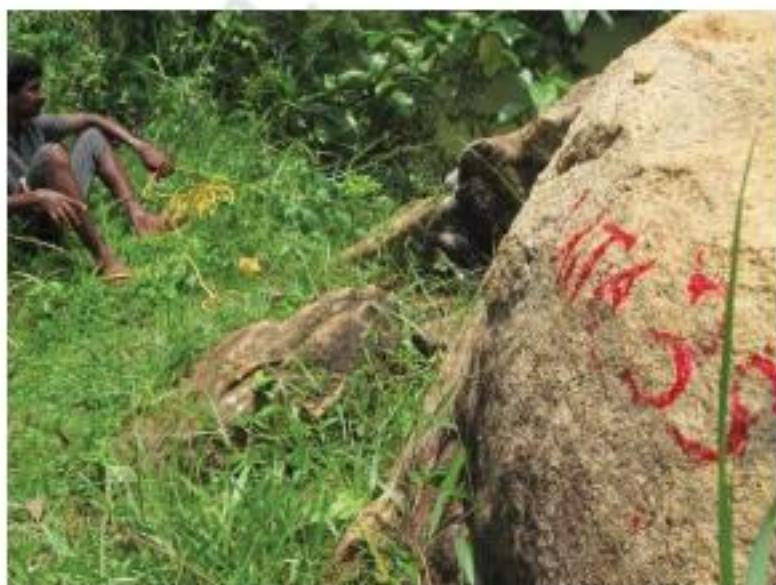


Profile – 35

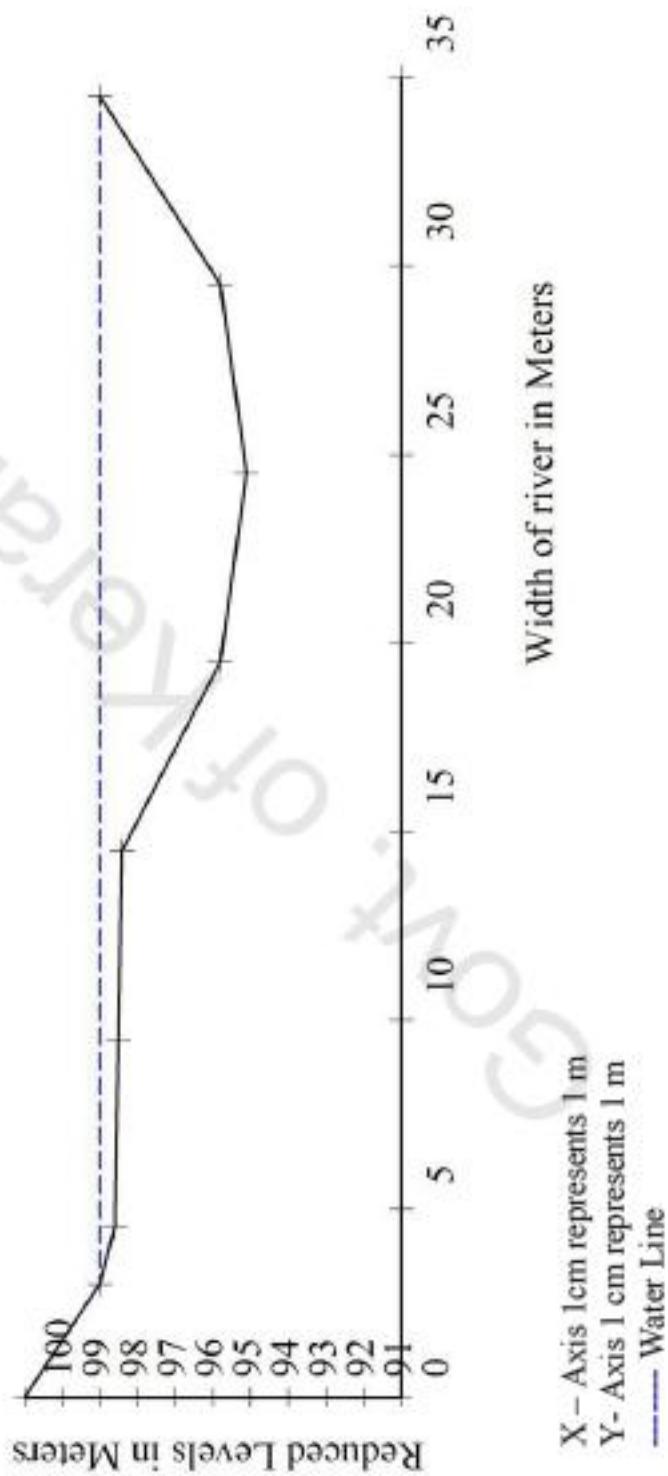
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.410			100.41	100	BM	0
	2.40			98.01	LBWE	3
	0.40 (2.8)			97.61	WD	4.5
	0.50 (2.9)			97.51	WD	9.5
	0.60 (3)			97.41	WD	14.5
	3.20 (5.6)			94.81	WD	19.5
	3.90 (6.3)			94.11	WD	24.5
	3.20 (5.6)			94.81	WD	29.5
		2.40		98.01	RBWE	34.5

The current river cross-section falls at the Kukkurni kadavu .The bench mark is a rock exposure on the left bank and is in Aryancode Grama panchayat.



PROFILE - 35
ARYANCODE GRAMA PANCHAYAT
TBM: Rock exposure on the left bank at Kukkiruni Kadavu



Profile-36

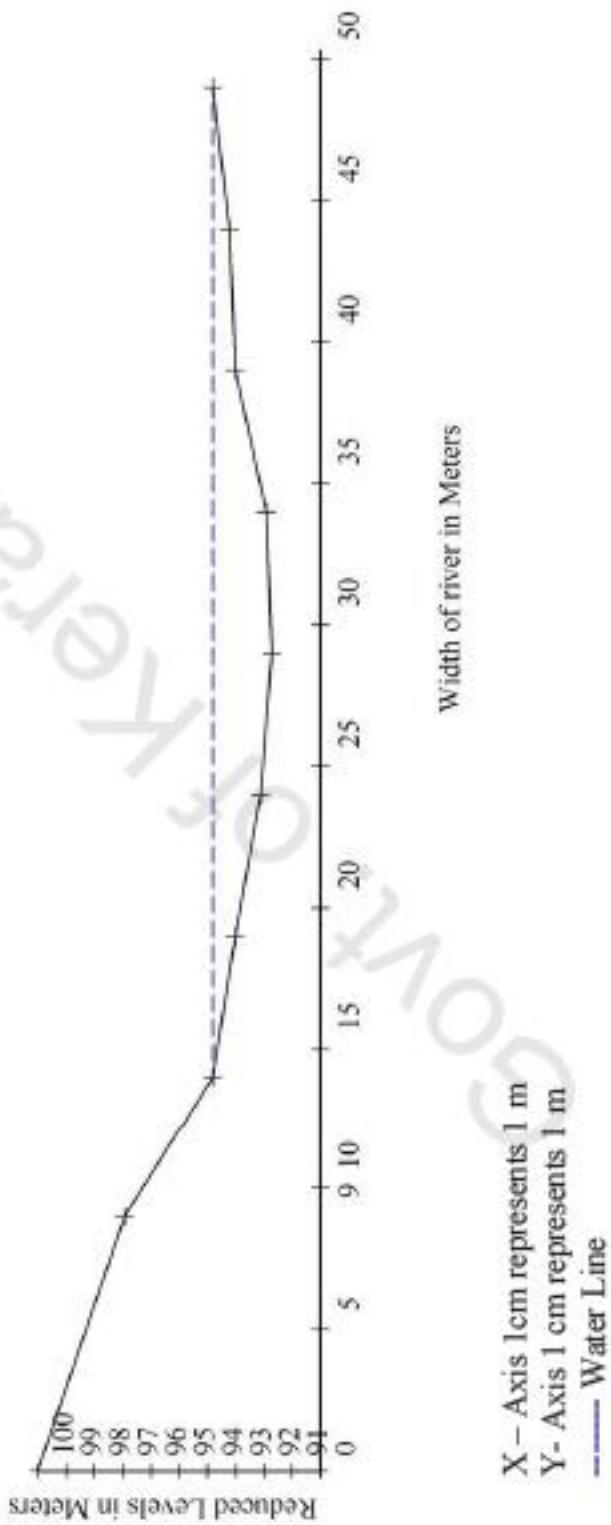
Field book

BS	IS	FS	HI	RL	Remarks	Distance
0.890			100.89	100	BML	0
1.425		3.960	98.355	98.355	LBWE	9
		4.535		93.81	WD	14
	0.80 (5.335)			93.02	WD	19
	1.70 (6.235)			92.12	WD	24
	2.10 (6.635)			91.72	WD	29
	1.90 (6.435)			91.92	WD	34
	0.80 (5.335)			93.02	WD	39
	0.60 (5.135)			93.22	WD	44
	4.540			93.81	RWE	49

The current river cross-section falls north of Aruvikkara pumphouse..The bench mark is a well on the left bank of the river and is in Aryancode Grama panchayat.



PROFILE - 36
NEYYATTINKARA MUNICIPALITY
TBM: Parapet of a domestic well (House No. 386) on the left bank



Profile-37

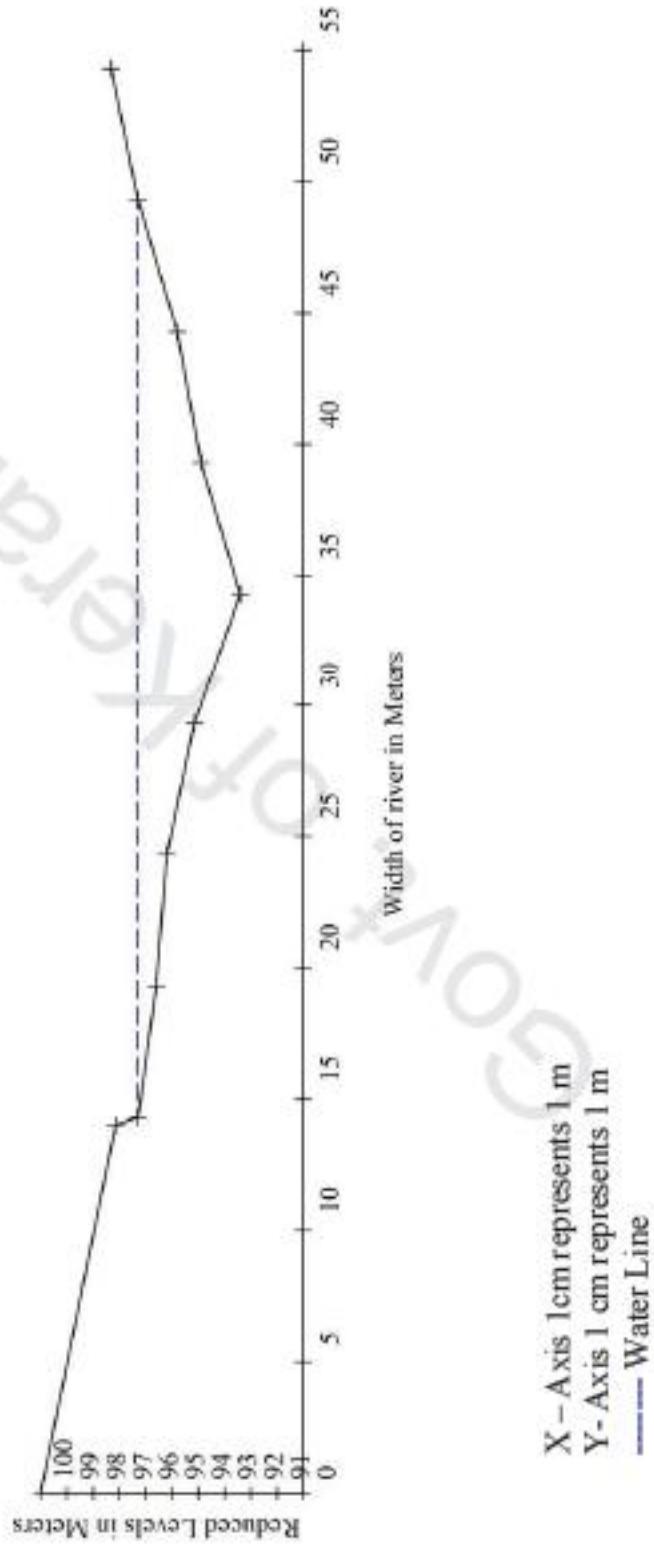
Field book

BS	IS	FS	HI	RL	Remarks	Distance
0.040			100.04	100	BM	
	2.90			97.14	LBP	14
	3.745			96.295	LBWE	14.3
	0.70 (4.445)			95.5959	WD	19.3
	1.10 (4.845)			95.195	WD	24.3
	2.10 (5.895)			94.145		29.3
	3.90 (7.645)			92.395		34.3
	2.40 (6.145)			93.895		39.3
	1.50 (5.245)			94.795		44.3
	3.745			96.295	RBWE	49.3
	2.73			97.31	RBP	54.3

The current river cross-section falls in Aruvikkara. The bench mark is the corner of a house on the left bank of the river and is in Aryancode Grama panchayat.



PROFILE - 37
ARYANCODE GRAMA PANCHAYAT
TBM: Basement of protection wall on the left bank



Profile-38

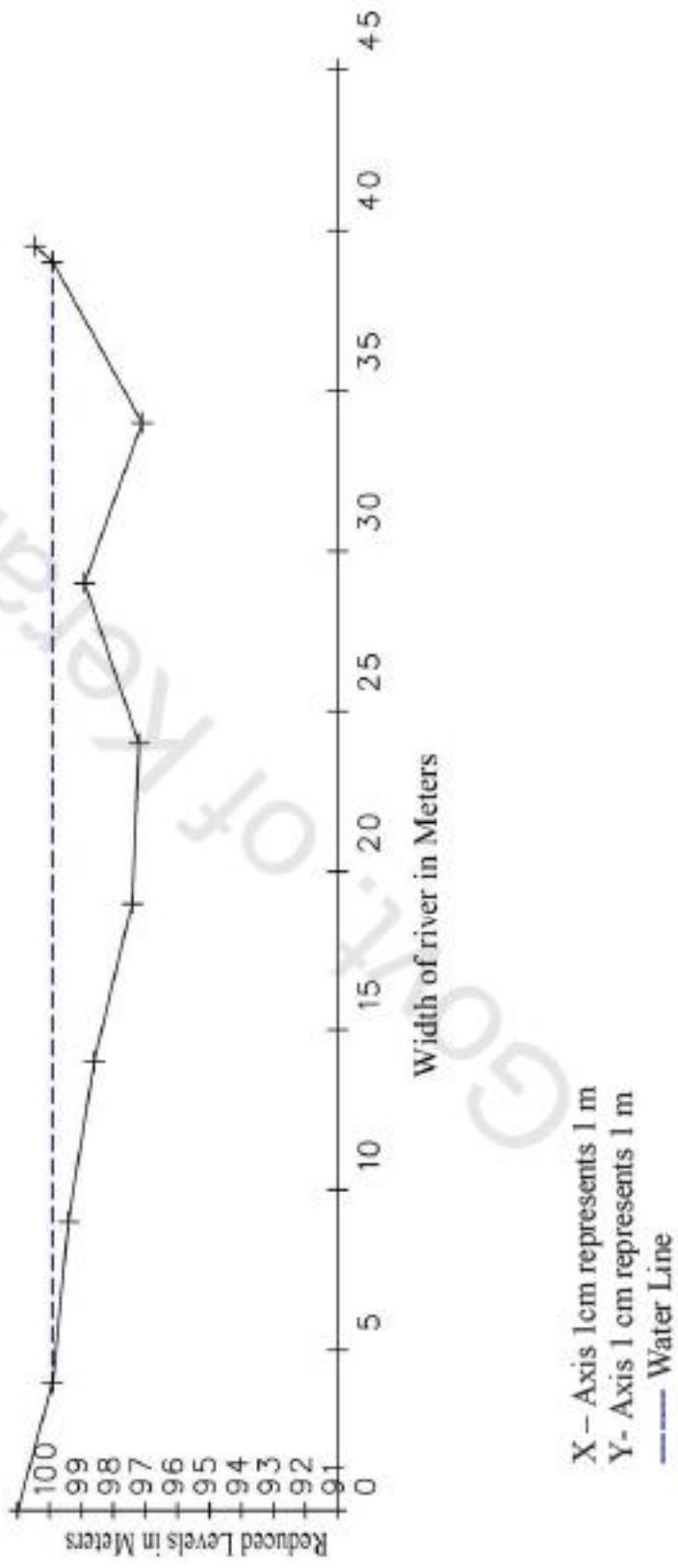
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.35			101.35	100	LBP	0
	2.44			98.91	LBWL	4
	.50(2.94)			98.41	WD	9
	1.30(3.74)			97.61	WD	14
	2.50(4.94)			96.41	WD	19
	2.70(5.14)			96.21	WD	24
	1.00(3.44)			97.91	WD	29
	2.80(5.24)			96.11	WD	34
	2.44			98.91	RBWL	39
		1.685		99.45		39.5

The present river cross-section has taken 100 m north of Arivikkara Bridge. The bench mark is established on base wall of Pumphouse on right bank. The bench mark is in the Maranalloor Panchayat. It lies between 08°28'03.6" N latitude to 77°05'22.9"E longitude.



PROFILE - 38
MARANALLOOR GRAMA PANCHAYAT
TBM: Base wall of Pump House on the right bank



Profile-39

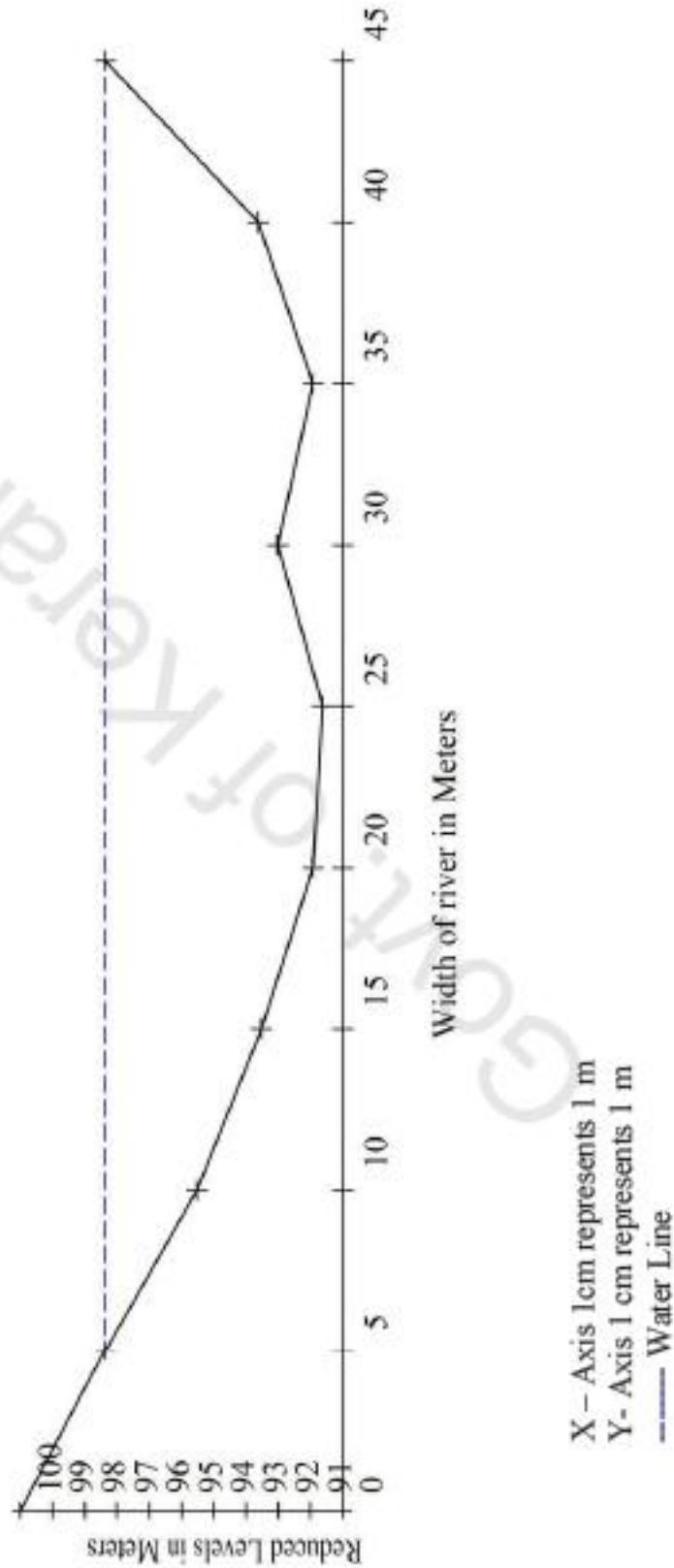
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
2.36			102.36	100	RBP	0
0.815		4.99	98.185	97.37	RBW+	5
	1.10(3.66)			94.525	WD	10
	3.10(5.66)			92.525	WD	15
	4.70(7.26)			90.925	WD	20
	5.00(7.56)			90.625	WD	25
	3.60(6.16)			90.025	WD	30
	4.70(7.26)			90.925	WD	35
	3.00(5.56)			92.625	WD	40
				97.37	LBWL	45

The present river cross-section has taken from Kidakuzhi of Aruvikkara ward in Maranalloor Panchayat. An electric post (EPM=PK67) on the right bank has taken as benchmark. River depth is high in this area. It lies between 08°27'49.9" N latitude to 77°05'22.9"E longitude.



PROFILE - 39
NEYVATTINKARA MUNICIPALITY
TBM: An electric post (EPM=PK67) on the right bank



Profile-40

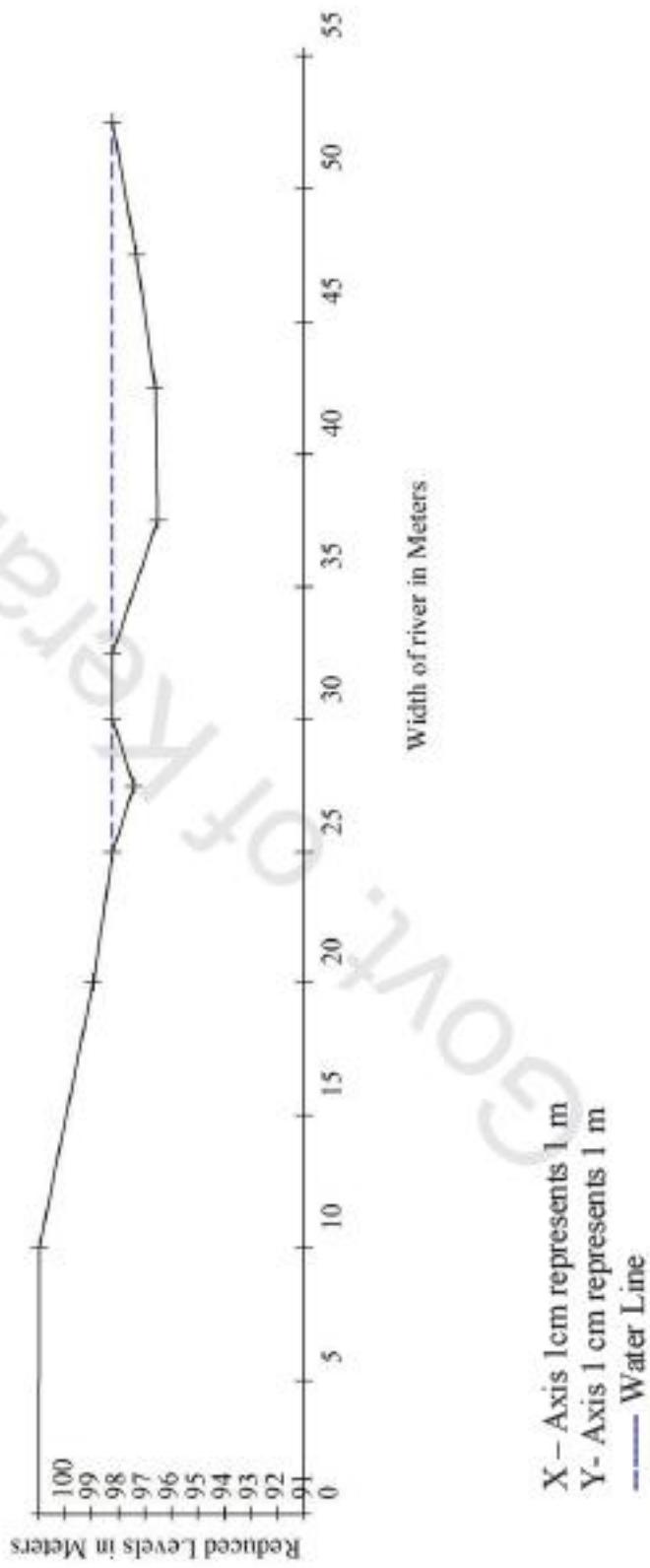
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.47	(BM)		101.47	100	RB	
	1.5			99.97	RBP	10
	3.525			97.945	RBP	20
	4.255			97.215	RB	25
	0.80(5.055)			96.415	WD	27.5
	4.255			97.215	Rock edge	30
	4.31			97.21	Rock edge	32.5
	1.70(5.955)			95.515	WD	37.5
	1.60(5.855)			95.615	WD	42.5
	0.90(5.155)			96.315	WD	47.5
	4.335			97.21	LBWE	52.5
					LBH	8m

The present river cross-section has taken from Kalluvarambu kadavu Veliamcode ward of Maranalloor Panchayat. Benchmark was established on private water tank on the right bank. It lies between 08°27'33.1" N latitude to 77°05'39.4" E longitude.



PROFILE - 40
NEYYATTINKARA MUNICIPALITY
TBM: Private Water Tank on the right bank



Profile-41

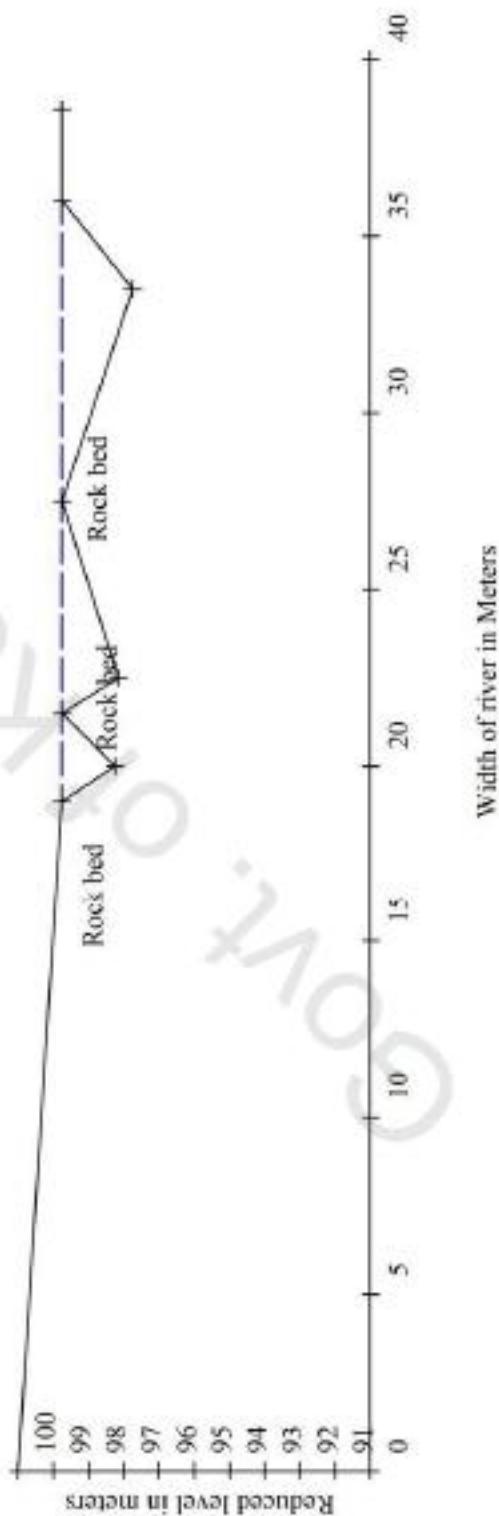
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.69			100.69	100	RB(LB)	0
	1.94			98.75	LBWL	19
	1.5(3.44)		ROCK	97.25	WD	20
	1.94			98.75	WL	21.5
	1.6M(3.54)			97.15 (ROCK)	WD	22.5
	1.94			98.75	WL	27.5
	2(3.94)			96.75	WD	33.5
	1.94			98.75	RBWL	36
		1.935		98.755	RBP	38.5

The present river cross-section has taken from Erattinpuram in Pasuvannara ward of Aryancode Grama panchayat. Benchmark was marked on backside of compound wall of a house in survey no.220. It lies between 08°27'27.1" N latitude to 77°05'27.3"E longitude.



PROFILE- 41
ARYANCODE GRAMA PANCHAYAT
TBM: Back side Compound wall of a house in survey no.220



X - Axis 1 cm represents 1 m
Y - Axis 1 cm represents 1 m
— Water Line

Profile-42

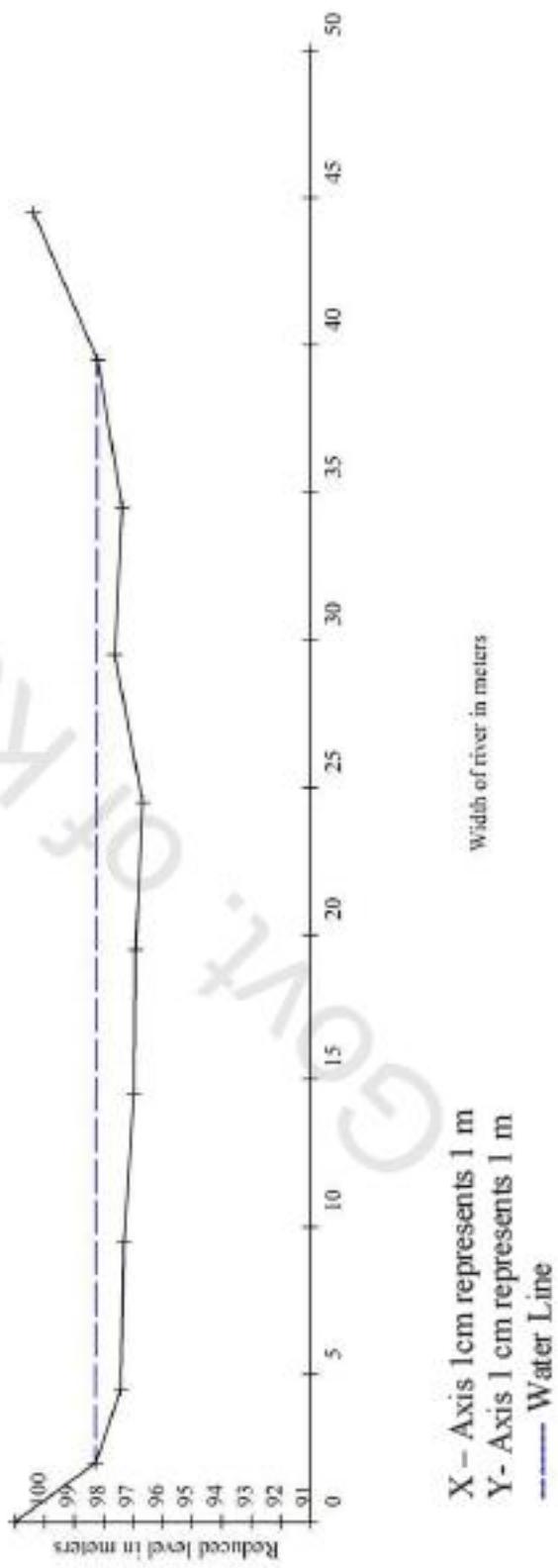
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.00					BM(RB)	0
0.94		3.24	100.94	100	CPI(RB)	0
	3.665		97.275	97.275	RBWL	2m
	84(4.515)			96.425	WD	45m
	.95(4.615)			96.325	WD	9.5
	1.30(4.965)			95.975	WD	14.5
	1.35(5.015)			95.925	WD	19.5
	1.60(5.265)			95.675	WD	24.5
	.65(4.31)			96.63	WD	29.5
	.90(4.565)			96.375	WD	34.5
	3.74			97.2	LBWL	39.5
		1.56		99.38		44.5

The present river cross-section has taken from Elavanikkara ward of Neyyattinkara Municipality. The benchmark here is on a tree on the right bank .An island which splits the river is visible .It lies between 08°27'20.4'' N latitude to 77°05'56.3''E longitude.



PROFILE - 42
NEYYATTINKARA MUNICIPALITY
TBM: Coconut tree on the right bank near a river island at Erattinpuram south



Profile-43

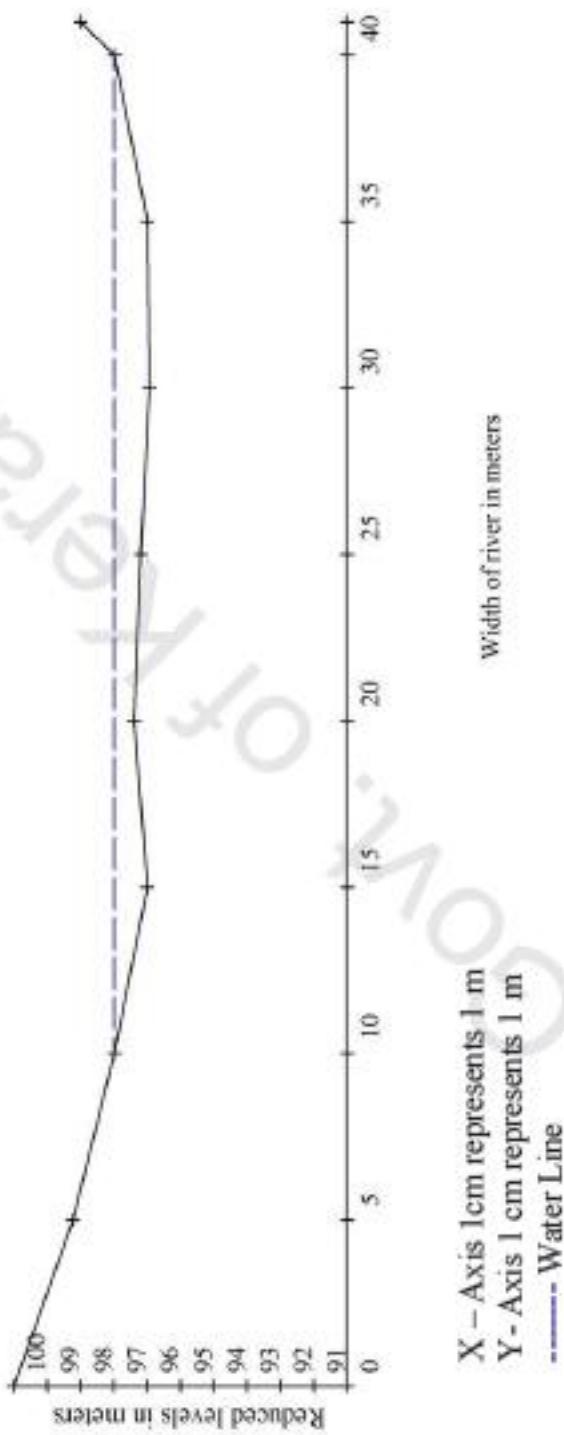
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
	1.41	1.41	101.41	100	RBP	0
1.035		3.18	99.215	98.23	RBP	5m
	2.275			96.99	RBWC	10
	.40(2.675)			95.59	WD	15
	.60(2.875)			96.39	WD	20
	.80(3.075)			96.19	WD	25
	1.05(3.325)			95.94	WD	30
	1.00(3.275)			95.99	WD	35
	2.28			96.99	WD	40
	1.25	1.25		98.01	LBP	41

This river cross-section has taken from Vallakadavu . The bench mark is marked in an electric post on right bank which falls in Neyyattinkara Municipality.Benchmark was established on private water tank on the right bank. It lies between 08°27'17.4" N latitude to 77°06'07.0"E longitude.



PROFILE 43
NEYYATTINKARA MUNICIPALITY
TBM: Electric post (MV 58/A) on the right bank



Profile-44

Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.195			101.195	100	BM	0
	1.64			99.555	RBP	1m
	1.975			99.22	RBWC	3
	.30(2.275)			98.92	WD	5.5
	.50(2.475)			98.72	WD	10.5
	.40(3.75)			98.82	WD	15.5
	.80(2.775)			98.42	WD	20.5
	1.05(3.205)			97.92	WD	25.5
	1.90(3.875)			97.32	WD	30.5
	.40(2.375)			98.82	WD	35.5
	1.98			99.215	LBWL	40.5
	0.49			100.765	LBP	45.5
		1.195			LBP	49.5

The present river cross-section has taken from Aruvipana .The bench mark is on rock exposure on the right bank which falls in the Elavanikara ward of Neyyattinkara Municipality. Veliamcode ward of Maranolloor Panchayat . It lies between 08°27'07.5'' N latitude to 77°06'14.5''E longitude



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Profile-45

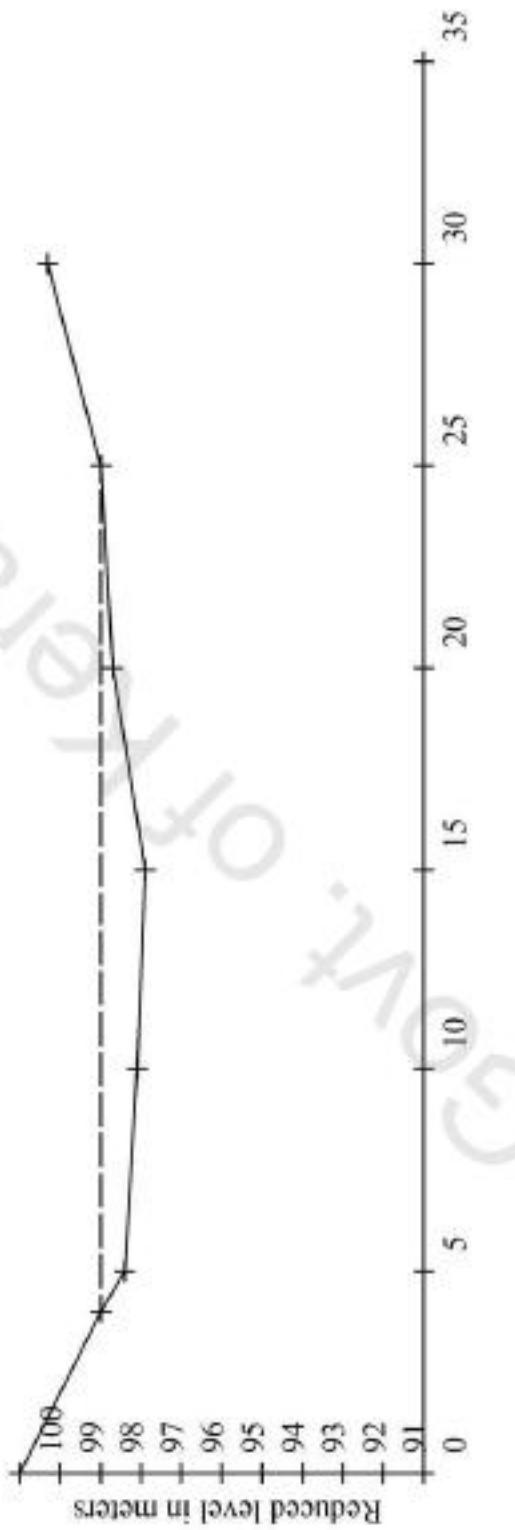
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
132			101.32	100	LBBM	0
	3.32			98	LBWL	4
	.60(3.92)			97.4	WD	5
	.90(4.22)			97.1	WD	10
	1.10(4.42)			96.9	WD	15
	.30(3.62)			97.7	WD	20
	3.52			97.8	RBWL	25
		3.32		98	RBP	30

The present river cross-section has taken from Elavanikkara ward of Neyyattinkara Municipality. Benchmark was established on a pump house on the left bank. It lies between 08°26'56.3" N latitude to 77°06'0.52"E longitude



PROFILE-45
NEYYATTINKARA MUNICIPALITY
TBM:Pump House (KWA) on the left bank



X - Axis 1 cm represents 1 m
Y - Axis 1 cm represents 1 m
— Water Line

Profile-46

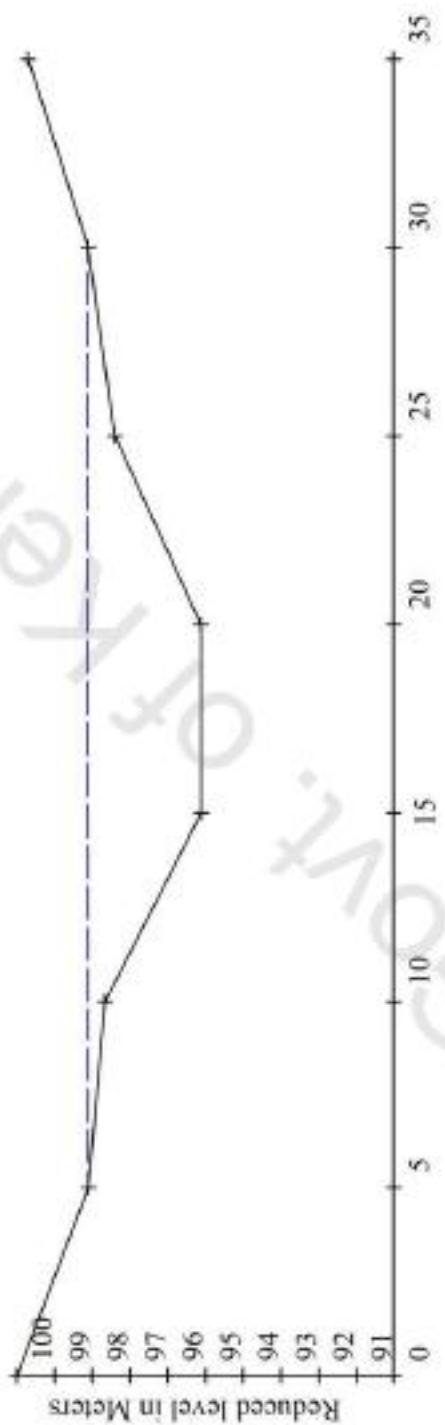
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.265			100.265	100	RBP	0
	2.15			98.115	RBPWL	5
	.35(2.5)			97.765	WD	10
	3.0(5.15)			95.115	WD	15
	3.0(5.15)			97.415	WD	20
	0.70(2.85)			98.145	WD	25
	2.15			98.155	LBWL	30
		0.555		99.71	LBP	35

The present river cross-section has taken from Neduvila kadavu .Protection wall on the right bank is taken as the bench mark which falls in Neyyattinkara Municipality. It lies between $08^{\circ}26'38.4''$ N latitude to $77^{\circ}06'0.41''$ E longitude



PROFILE - 46
NEYVATTINKARA MUNICIPALITY
TBM: Protection wall on the right bank at Neduvila Kadavu



X-Axis 1 cm represents 1 m
Y-Axis 1 cm represents 1 m
— Water Line

Profile-47
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
.540			100.54	100	RBP	0
	1.04			99.5	RBP	2
	1.505			99.035	RBWC	3
	1.00(2.505)			98.035	WD	8
	1.10(2.605)			97.935	WD	13
	1.00(2.505)			98.035	WD	18
	.80(2.305)			98.235	WD	23
	.90(2.405)			98.135	WD	28
	1.535			99.005	LBWL	33
	0.55	0.55		99.95	LBP	34.5

The present river cross-section has taken from Kovil kadavu and is 80 m south of Mampazhakkara bridge. Benchmark was established on an electric post on the right bank. It lies between 08°26'23.3" N latitude to 77°05'54.2"E longitude



Govt. of Kerala

Profile-48
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.14			100.14	100	LB(BM)	0
	0.95			99.99	LBP	2
	1.68			99.46	LBWL	5.5
	0.41(2.09)			98.46	WD	10.5
	1.00(2.68)			97.46	WD	15.5
	1.50(3.18)			96.96	WD	20.5
	1.10(2.78)			97.36	WD	25.5
	1.00(2.68)			97.46	WD	30.5
	1.65			99.46	RBWL	35.5

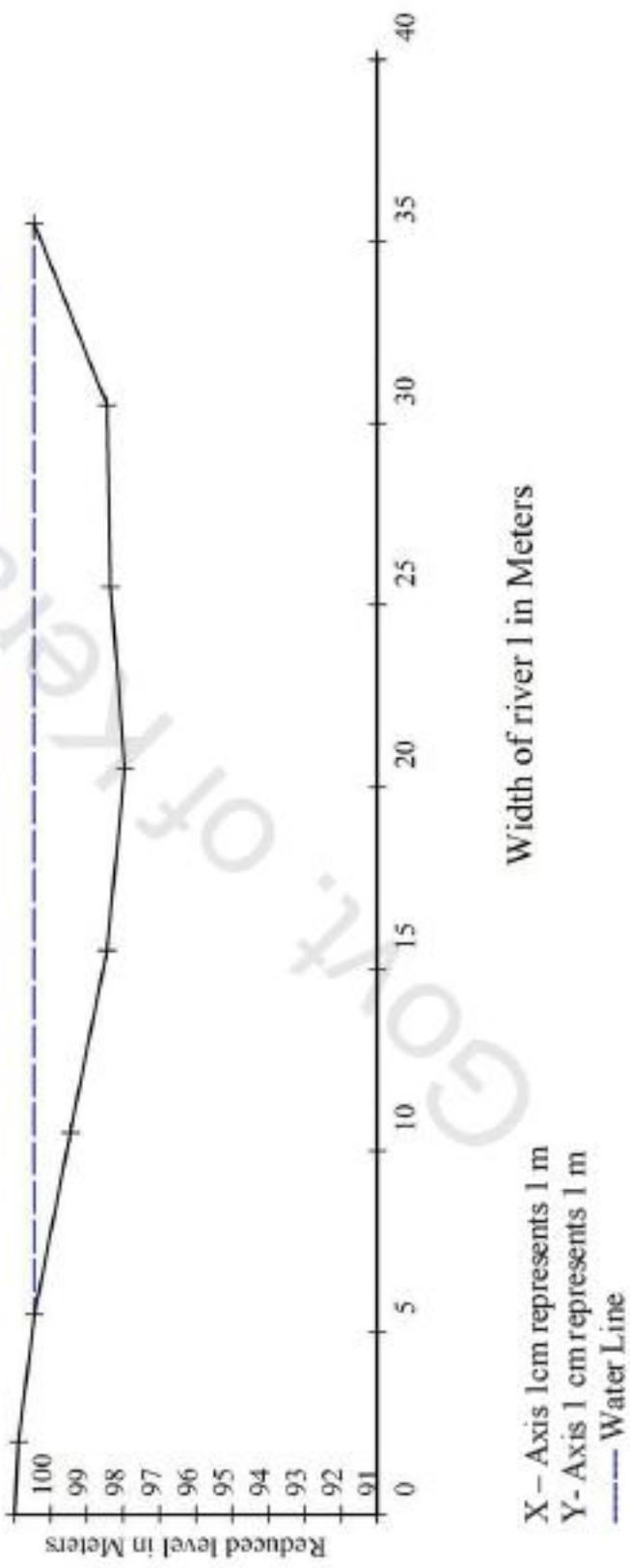
The present river cross-section has taken from Kodithottathu kadavu. The edge of protection wall on the left bank is the bench mark of the present profile which falls in Perumkadavila Panchayat. It lies between $08^{\circ}26'17.4''$ N latitude to $77^{\circ}06'05.4''$ E longitude



PROFILE- 48

PERUMKADAVILA GRAMA PANCHAYAT

TBM:Right side edge of side wall constructed at Kodithottathu kadavu



Profile – 49

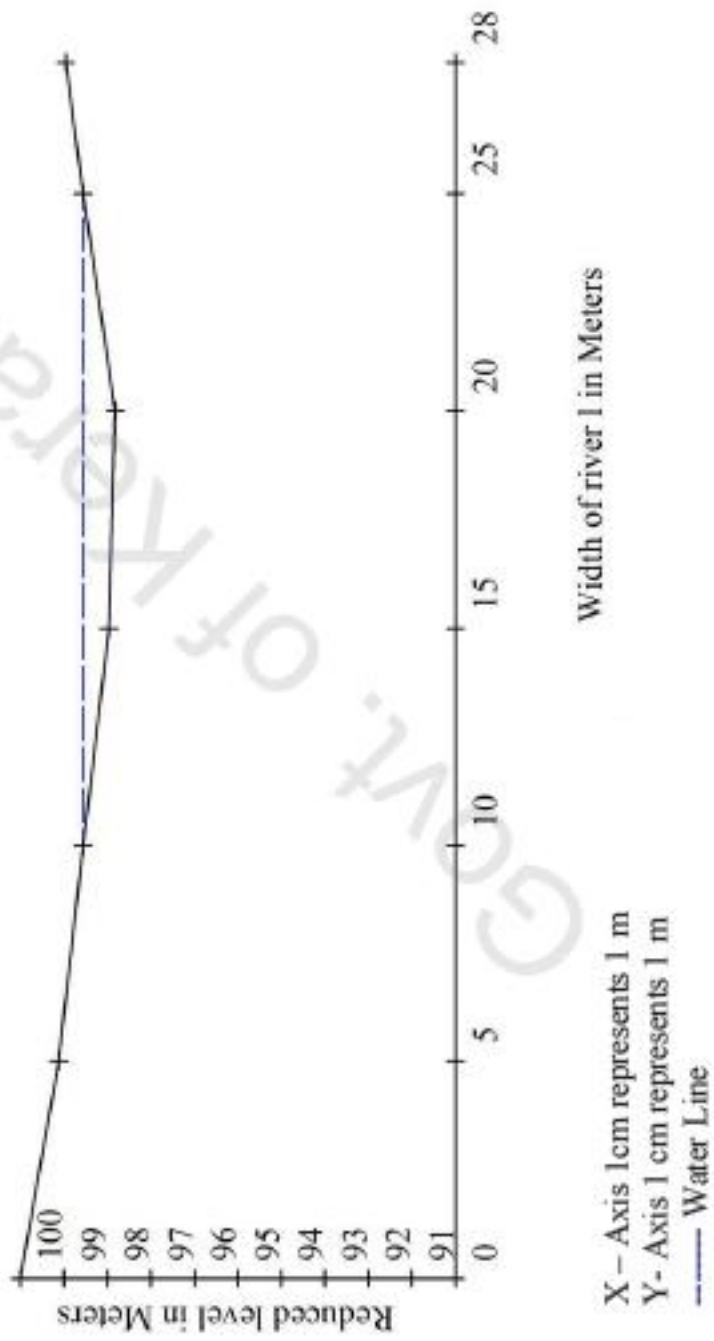
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.215			100.215	100	BM	0
	1.125			99.125	LBP	5
	1.655			98.56	LBWL	10
	0.50 (2.155)			97.47	WD	15
	0.65 (2.305)			97.82	WD	20
	1.655			98.56	RBWL	25
		1.25		98.965	RBP	28

The current river cross-section falls at the Thottathu kadavu .The bench mark is on a survey stone the left bank and is in Perumkadavila Grama panchayat. It lies between $08^{\circ}26'13.7''$ N latitude to $77^{\circ}06'02.4''$ E longitude



PROFILE 49
PERUMKADAVILA GRAMA PANCHAYAT
TBM: Survey stone on the left bank



X - Axis 1cm represents 1 m
Y - Axis 1 cm represents 1 m
— Water Line

Profile-50

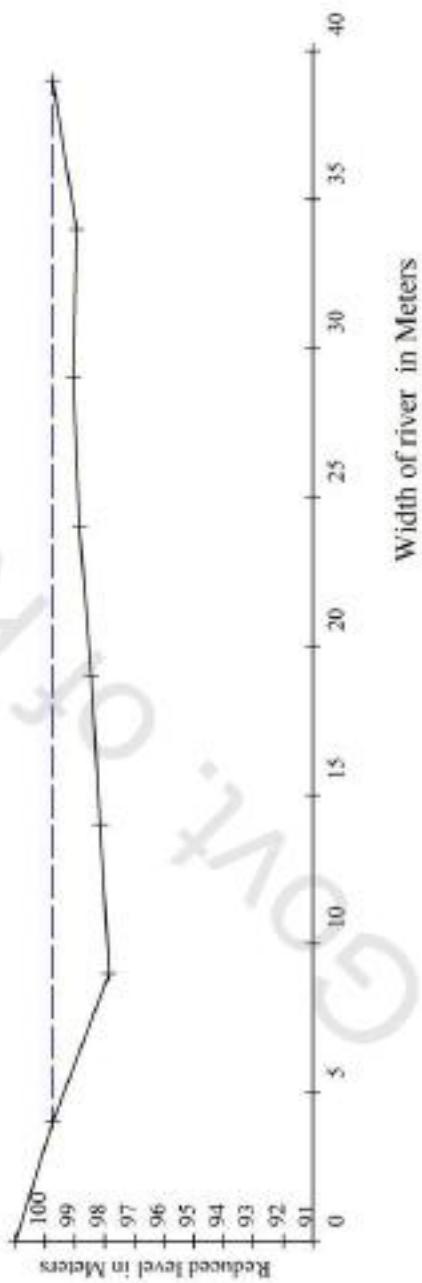
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.06			101.06	100	BMLBP	0
	2.305			98.755	LBWL	4
	1.90(4.205)			96.855	WD	9
	1.60(3.905)			97.155	WD	14
	1.30(3.605)			97.455	WD	19
	.90(3.205)			97.855	WD	24
	.70(3.005)			98.055	WD	29
	.80(3.105)			97.955	WD	34
	2.305			98.755	LBWL	39

The present river cross-section has taken from Pandarathottam kadavu. Benchmark is marked at the edge of kadavu side wall which is in Perumkadavila Panchayat. It lies between 08°26'00.1'' N latitude to 77°05'57.8'' E longitude



PROFILE 50
PERUMKADAVILA GRAMA PANCHAYAT
TBM: Left side edge of kadavu side wall at Pandarathottam kadavu



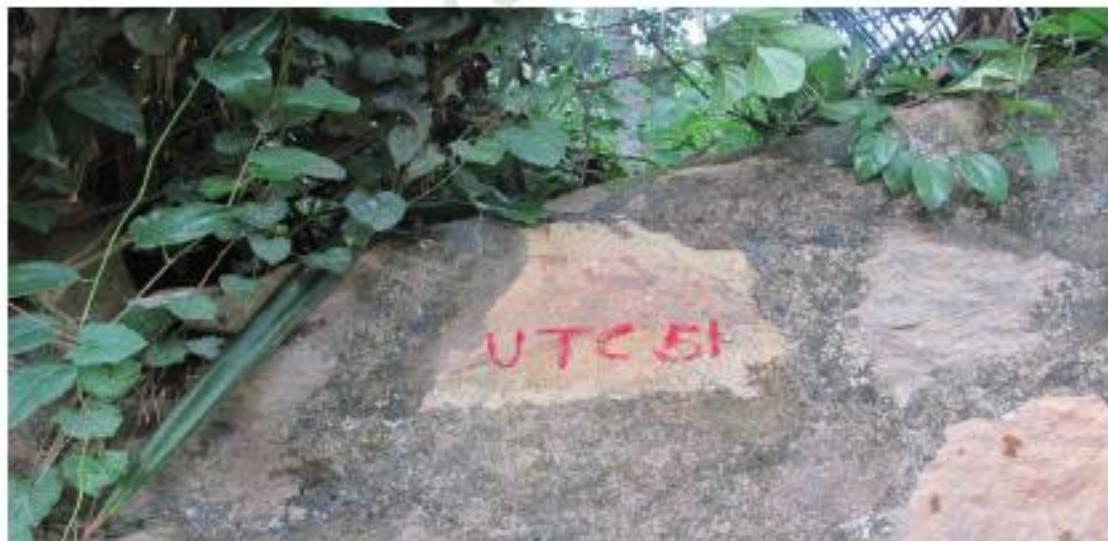
X—Axis 1 cm represents 1 m
Y—Axis 1 cm represents 1 m
—— Water Line

Profile-51

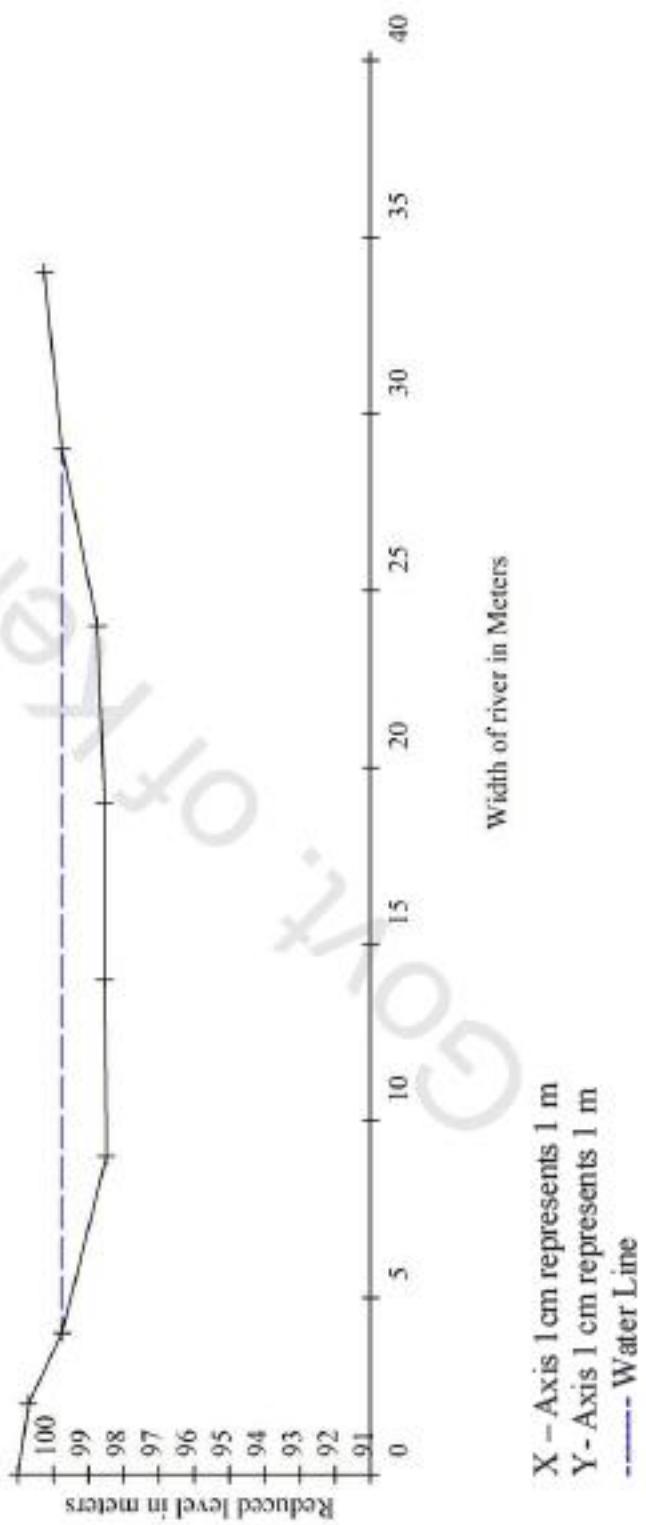
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.52			100.52	100	(RBP) BM	0
	0.81			99.71	RBPWL	2
	1.770			98.75		4
	1.60(3.37)			97.15		9
	1.20(2.97)			97.55		14
	1.20(2.97)			97.55		19
	1.100(2.77)			97.75		24
	1.770			98.75		29
	1.265			99.255		34

The current river cross-section has taken from Karuthila kadavu. Benchmark is marked on side wall of the kadavu which falls in Neyyattinkara Municipality on the right bank. It lies between $08^{\circ}25'53.4''$ N latitude to $77^{\circ}05'47.6''$ E longitude



PROFILE-51
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall on the right bank



Profile-52

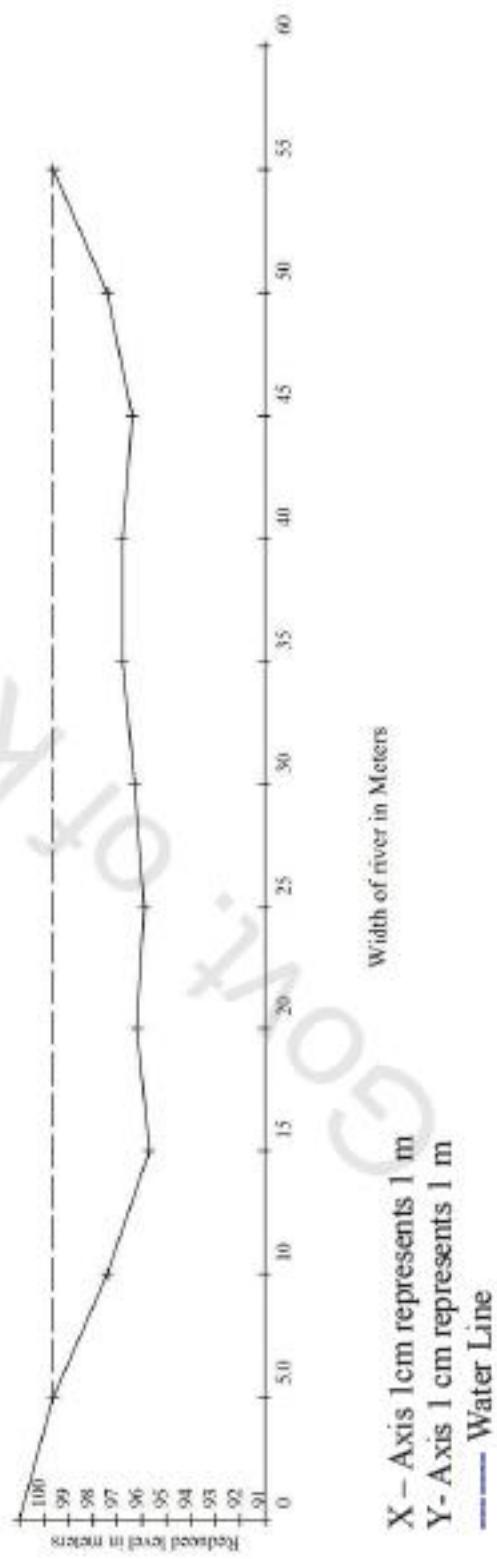
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.45	(BM-BS)		10.255		RBP	0
	2.645			98.61	RBWL	1
	2.20(4.845)			96.41	WD	6
	3.90(6.545)			94.71	WD	11
	3.40(6.045)			95.21	WD	16
	3.70(6.345)			94.91	WD	21
	3.30(5.945)			95.31	WD	26
	2.50(5.445)			95.8	WD	31
	2.80(5.445)			95.8	WD	36
	3.20(5.845)			95.41	WD	41
	2.20(4.845)			96.41	WD	46
		2.645		98.61	LBWL	51

The present river cross-section has taken from Vettupara kadavu. The benchmark here is on an electric post on the right bank which is in Neyyattinkara Municipality. It lies between 08°25'45.5'' N latitude to 77°05'39.3'' E longitude



PROFILE -52
Neyattinkara Municipality
TBM: Edge of protection wall on the right bank at Karuthilakkadavu

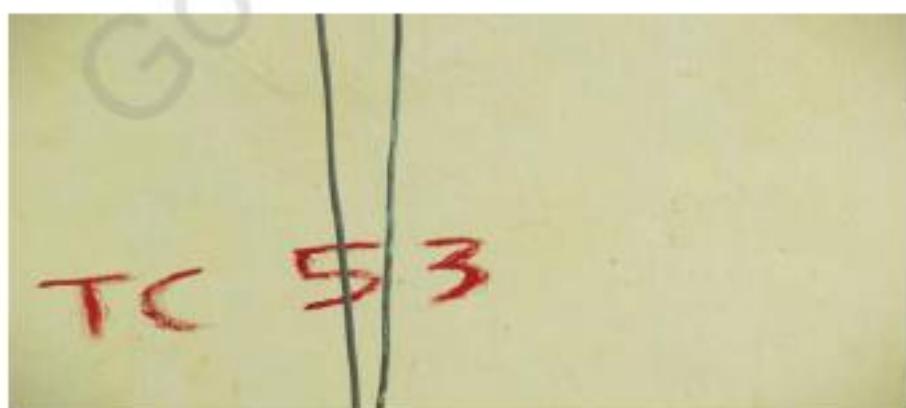


Profile-53

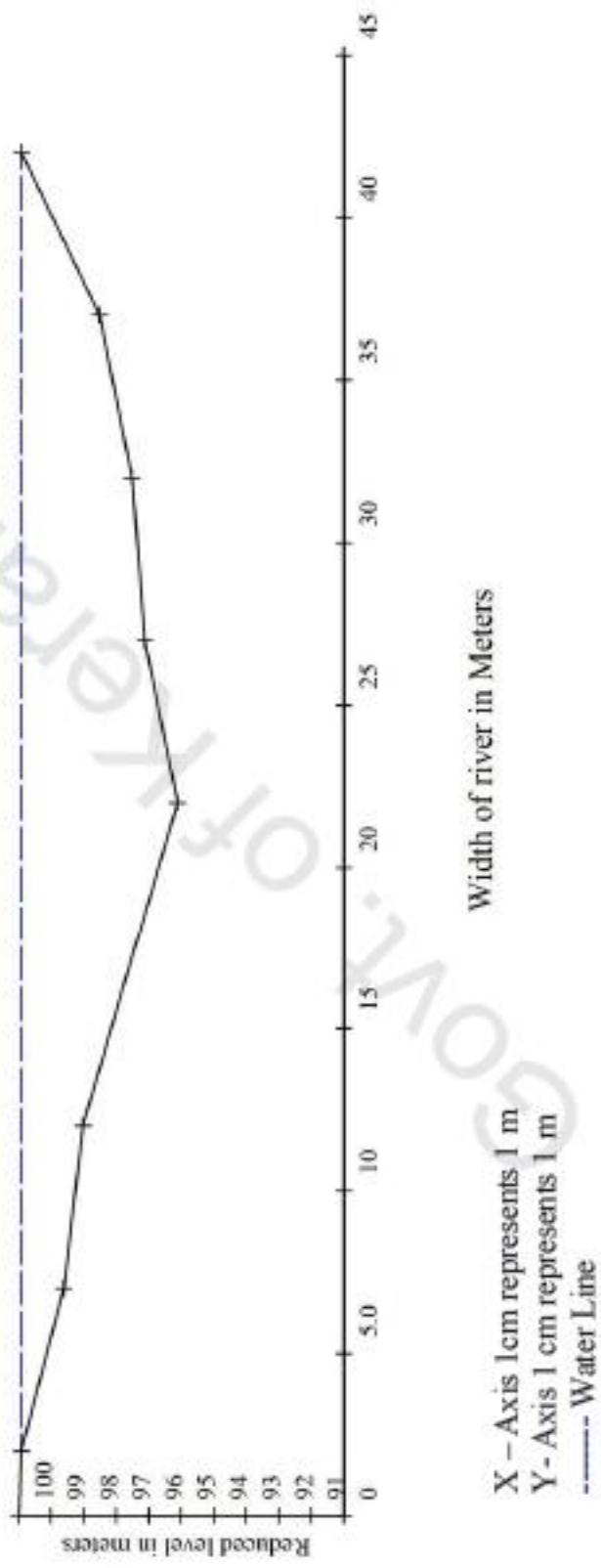
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
3.925			103.925	100	RBPWL	0
	1.30(5.225)			98.7	WD	5
	1.90(825)			98.1	WD	10
	1050(5.425)			98.5	WD	15
	4.30(8.225)			95.7	WD	20
	3.80(7.725)			95.7	WD	25
	3.40(7.325)			96.6	WD	30
	2.40(6.325)			97.6	WD	35
	3.925			100	LBWL	40

The present river cross-section has taken from south of Aruvippuram bridge A water tank on the right bank is the bench mark which falls in Neyyattinkara Municipality. It lies between 08°25'35.5" N latitude to 77°05'31.0" E longitude



PROFILE -53
NEYYATTINKARA MUNICIPALITY
TBM: KWA water tank on right bank



Profile-54

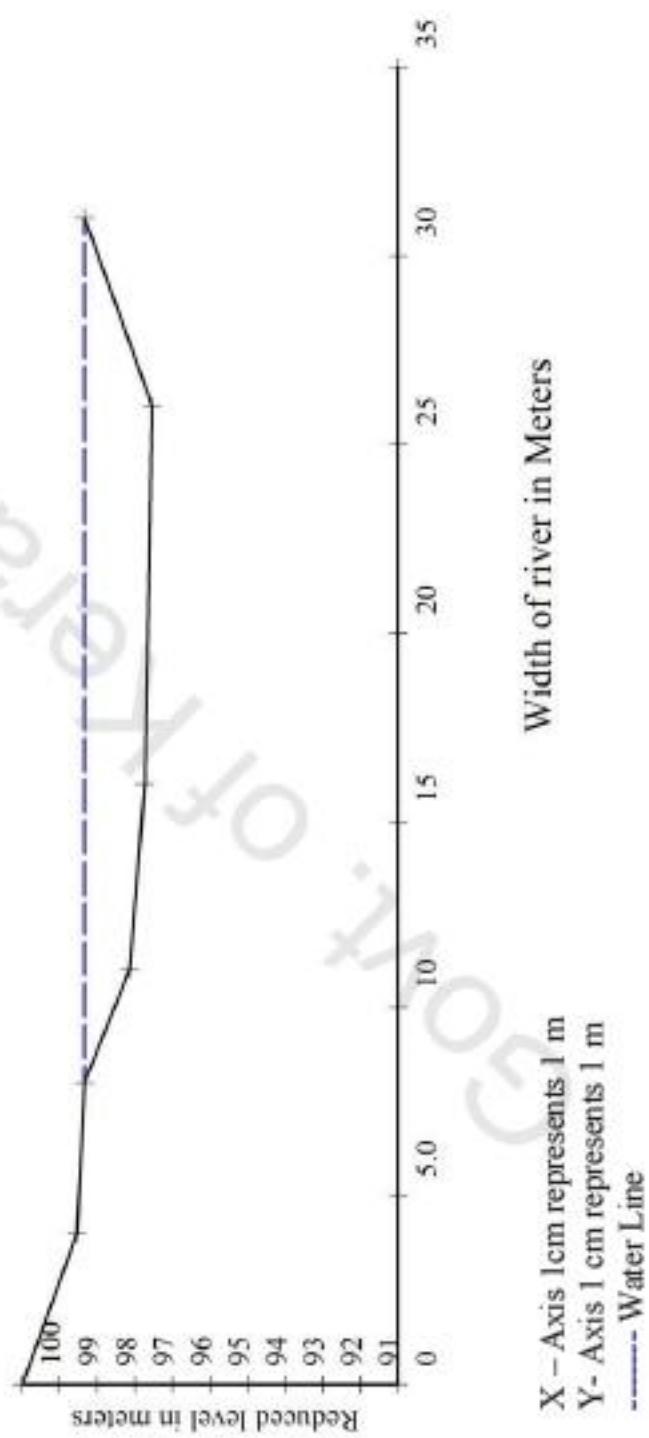
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.2			100.2	100	BM(LBP)	0
	1.655			98.545	LBP	4m
	1.855			98.345	RBWL	8
	1.20(3.055)			97.145	WD	11
	1.60(3.455)			96.745	WD	16
	1.40(3.255)			96.945	WD	21
	1.80(3.655)			96.545	WD	26
		1.855		98.345	RWL	31

The present river cross-section has taken from Aruvippuram Temple Kadavu. Benchmark was established at the protection wall on the right bank. It lies between 08°25'25.4'' N latitude to 77°05'35.4'' E longitude



PROFILE -54
NEYYATTINKARA MUNICIPALITY
TBM: Top part of Aruvipuram temple protection wall on the left bank



Profile-55

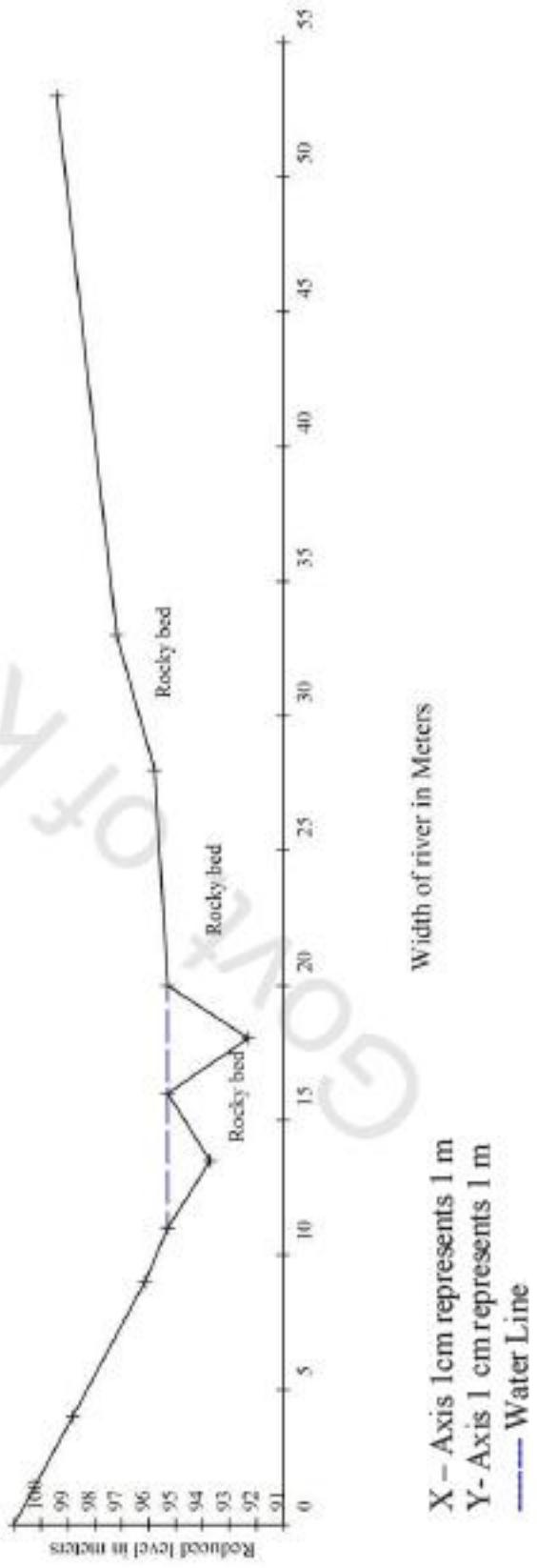
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
1.455			101.455	100	BM	0
0.755		3.63	98.58	97.825	RBP	4
	3.265			95.315	RBP	9
	4.285			94.295	RBWL	11
	2.6m(5.865)			92.715 ROCK	WD	13.5
	4.285			94.295 ROCK	WL	16
	3.00(7.285)			91.295	WD	18
	4.285			94.825	WL(LB)	20
	4.210			94.78	LBP	28
	2.40			96.18	LBP	33
		0.156		98.424	LBP	53

The present river cross-section has taken from Kunnumanal kadavu in Plavila ward of Neyyattinkara Municipality. Benchmark was established on the step to the Kadavu. It lies between $08^{\circ}25'19.8.''$ N latitude to $77^{\circ}05'33.4.''$ E longitude



PROFILE-55
NEYYATTINKARA MUNICIPALITY
TBM: First step to the river on the right bank

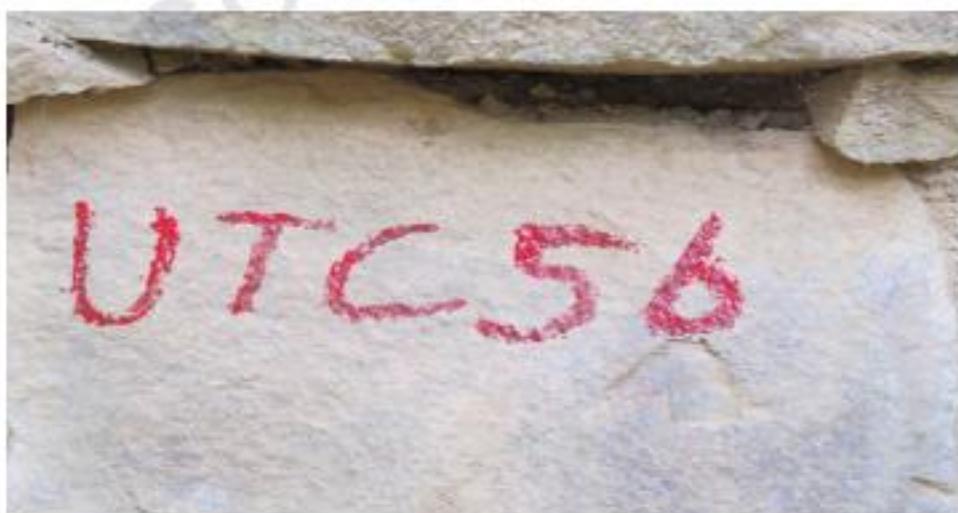


Profile-56

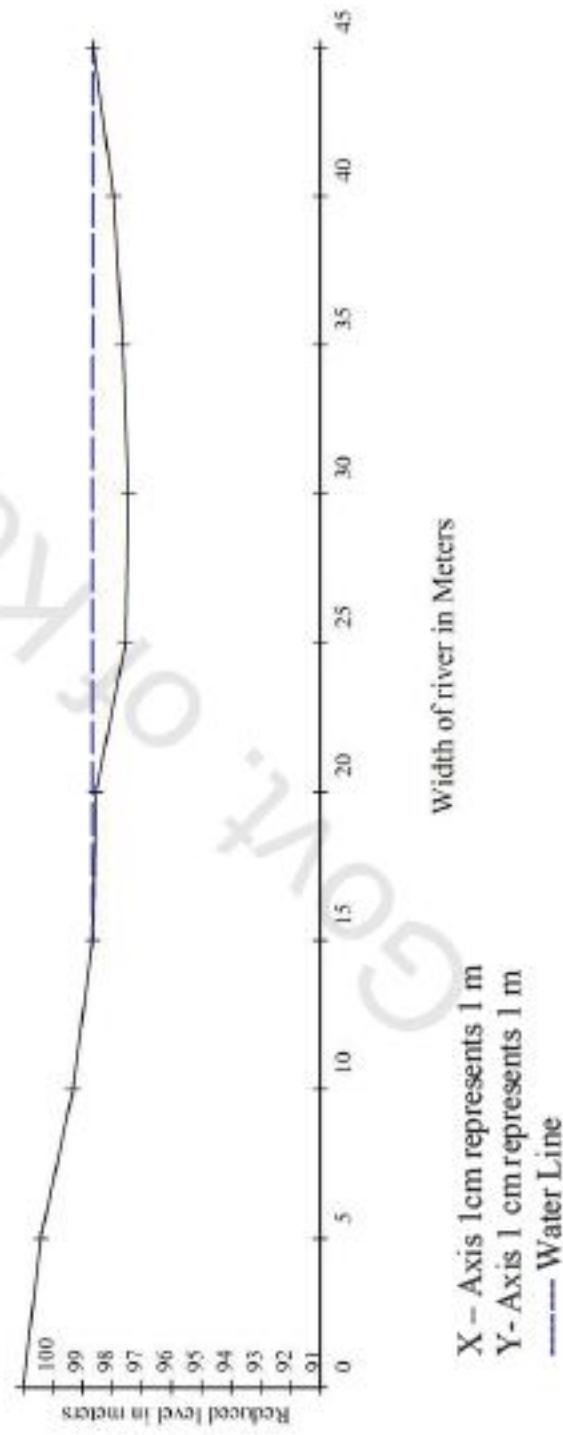
Field Book

BS	IS	FS	HII	RL	Remarks	Distance
1.20			101.2	100	BM	0
	1.810	3.63		99.39	RBP	5
	2.880			98.32	RBP	10
	3.545			97.655	RBWL	15
	.10(3.645)			97.555	WD	20
	1.10(4.645)			96.55	WD	25
	1.20(4.745)			96.455	WD	30
	1.100(4.345)			96.655	WD	35
	.70(4.245)			96.955	WD	40
		3.545		96.18	LBP	45

The present river cross-section has taken from Chemparathivila kadvu .The bench mark here is on the side wall of the kadavu and is in Neyyattinkaara Municipality. It lies between 08°24'54.5'' N latitude to 77°05'30.5''E longitude



PROFILE - 56
Neyyattinkara Municipality
TBM: Edge of side wall Chemparathivila kadavu on the Right bank



Profile-57

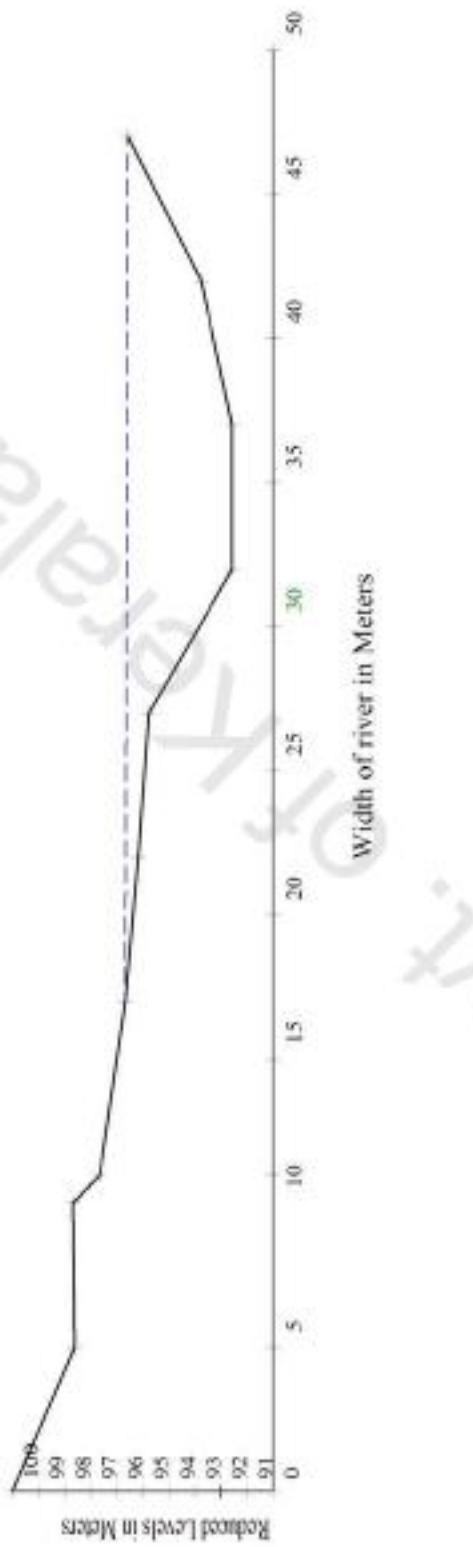
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.95		1.41	100.95	100	RBP	BM
	3.20			97.63	RBP	5m
	3.265			97.685	RBP	10
0.580		4.3		96.65	CP1	11
	1.565			95.665	RBWL	17
	.56(2.065)			95.165	WD	22
	0.90(2.465)			94.765	WD	27
	4.10(5.665)			91.565	WD	32
	4.10(5.665)			91.565	WD	37
	2.90(4.465)			92.765	WD	42

This river cross-section has taken from Vazhthoor Kadavu of Neyyattinkara Municipality . The bench mark here is in an electric post on the right bank.



PROFILE - 57
NEYYATTINKARA MUNICIPALITY
TBM: Top part of side wall constructed near Anuvippuram temple.



X – Axis 1cm represents 1 m
Y- Axis 1 cm represents 1 m
— Water Line

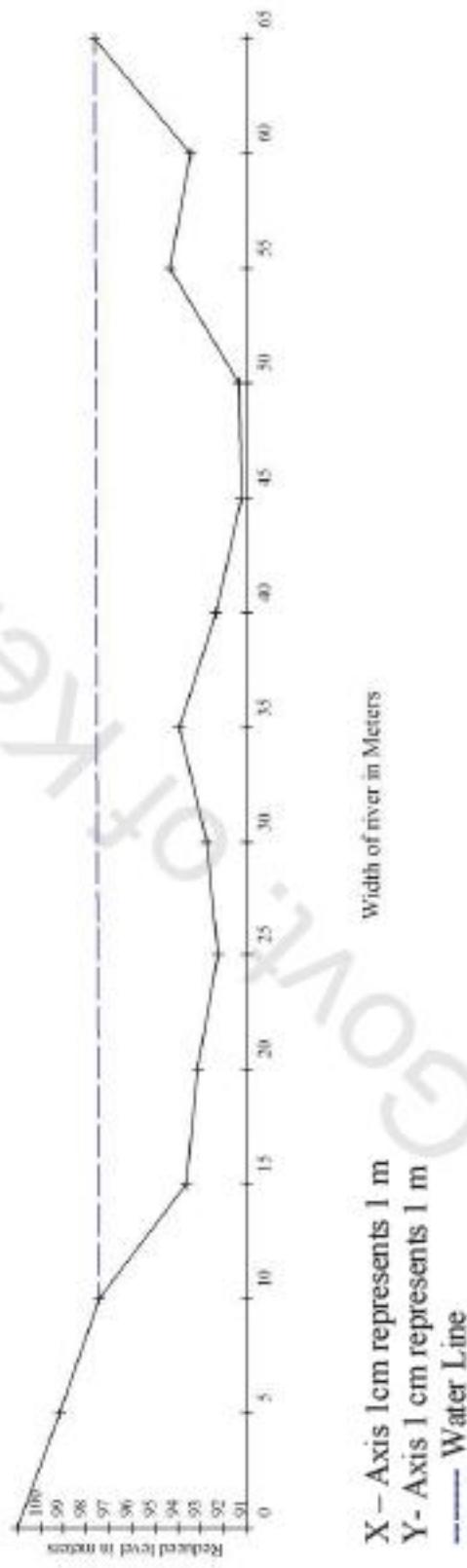
Profile 58

Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.65			100.65	100	BS	0
	2.50			98.15	RBP	5
	4.21			96.44	RBWL	10
	3.8(8.01)			92.64	WD	15
	4.3(8.51)			92.14	WD	20
	5.2(9.41)			92.24	WD	25
	4.7(8.91)			91.74	WD	30
	4.2(8.41)			92.24	WD	35
	5.1(9.31)			91.34	WD	40
	6.2(10.41)			90.24	WD	45
	6.1(10.31)			90.34	WD	50
	3.10(7.31)			93.34	WD	55
	4.0(8.21)			92.44	WD	60
	4.21	4.21		96.44	LBWL	65

This profile has taken from 25654 m downstream of Neyyar Reservoir Bridge. It falls in Neyyattinkara Municipality. No benchmark is available in this area.

PROFILE-58
NEYYATTINKARA MUNICIPALITY
TBM: 217 m north of Arakkunnu Kadavu



Profile-59

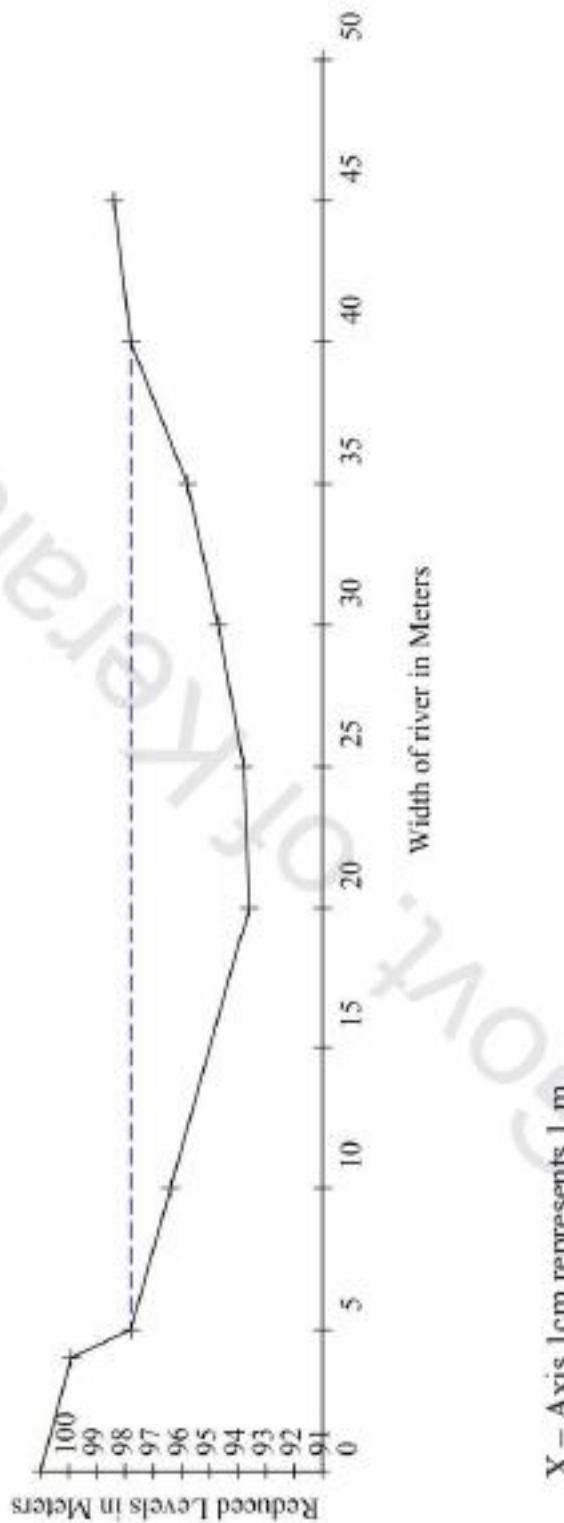
Field Book

BS	IS	FS	HI	RL	Remarks	Distance
0.210			100.21	100	RBP	BM
	2.120			98.9	RBP	4
	3.420			96.79	RBWL	5
	1.40(4.82)			95.39	WD	10
	2.90(6.32)			93.89	WD	15
	4.20(7.62)			92.59	WD	20
	4.0(7.42))			92.79	WD	25
	3.10(6.52)			93.69	WD	30
	2.00(5.42)			94.79	WD	35
	3.420			96.79	LBWL	40
		2.810		97.4	LBP	45

This river cross-section has taken from Arakkunnu kadavu of Neyyattinkara Municipality. The bench mark here is on the protectionwall on the right bank.



PROFILE - 59
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall south of Arakkunnu bridge



Profile 60

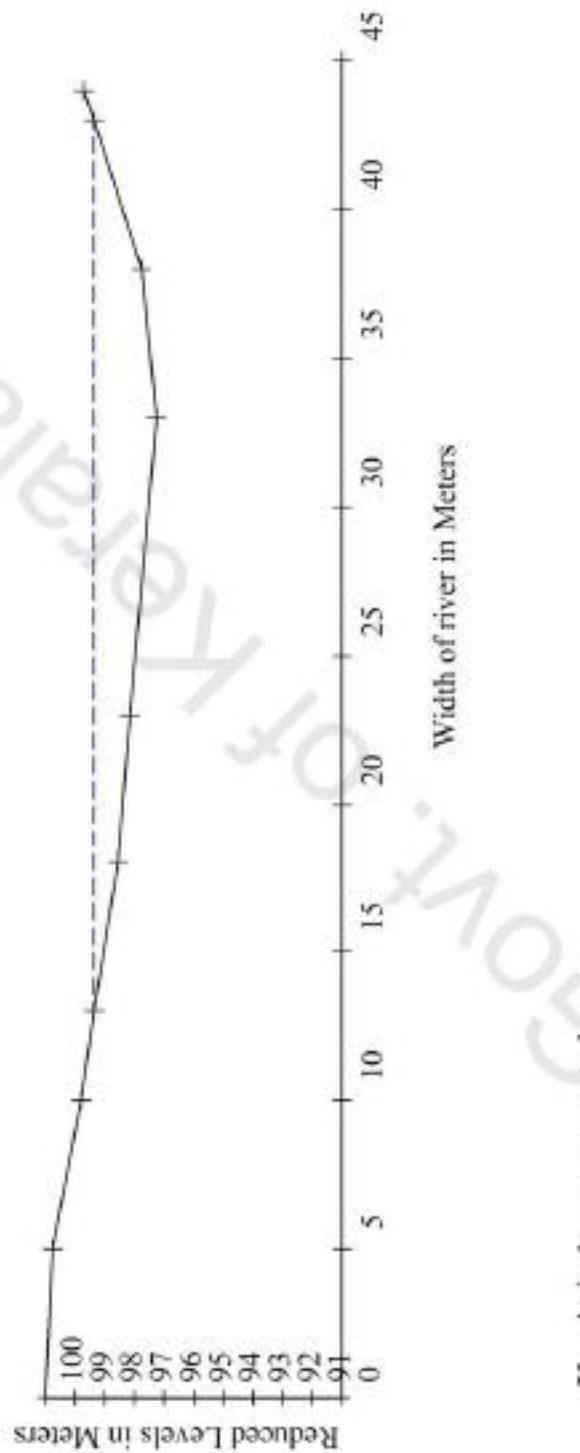
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.90			100.9	100	BM (LB)	
1.145				99.755	BS of profile	5
	2.110			98.79	LBD	10
	2.545			98.355	LBWL	13
.80 (3.345)				97.555	WD	18
1.20 (3.745)				97.155	WD	23
.60 (3.145)				97.755	WD	28
2.10 (4.645)				96.255	WD	33
1.60 (4.145)				96.775	WD	38
	2.545			98.355	RBWL	43
		2.20		98.7	RBP	44

This profile falls at the Mudippura kadavu of Vazhthoor war of Neyyattin kara Municipality. Edge of protection wall on the left bank is taken as benchmark. It lies between $08^{\circ}24'16.1''$ N latitude and $077^{\circ}05'25.5''$ E longitude



PROFILE - 60
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall on the left bank at Mudippura Kadavu



Profile 61

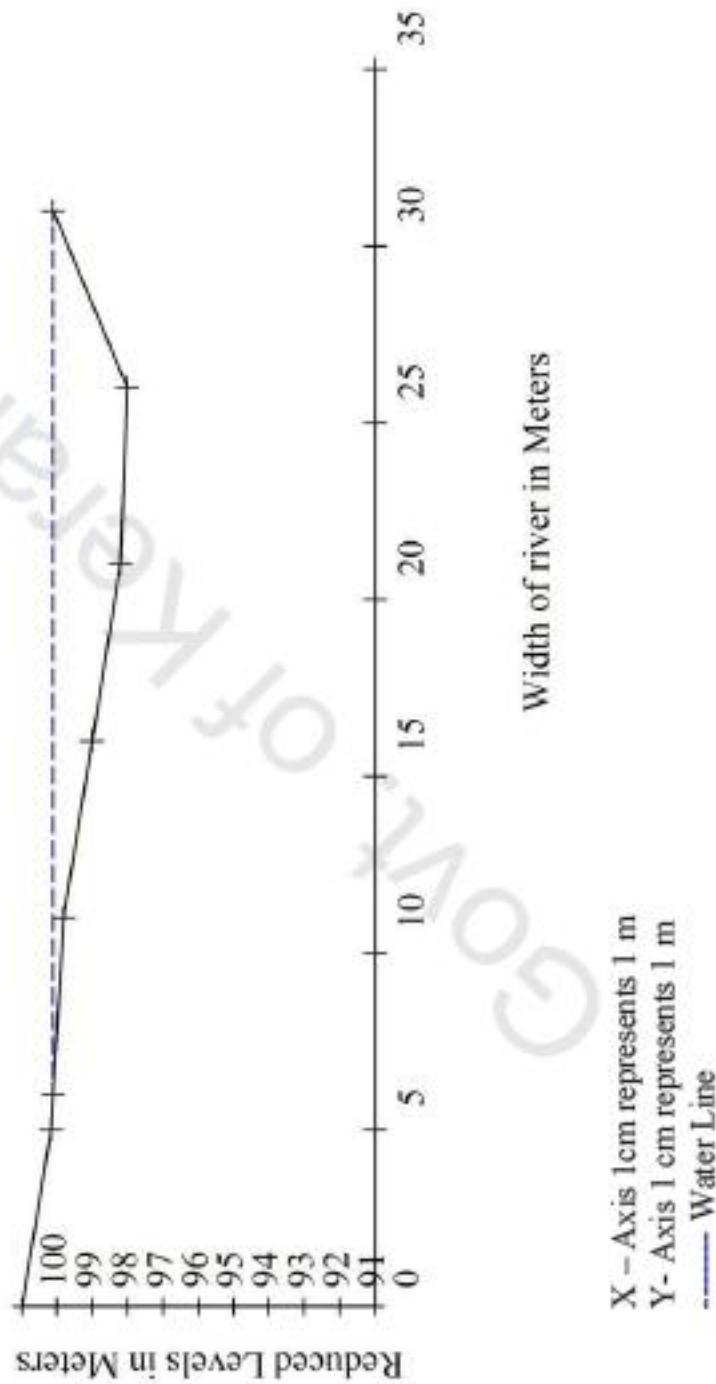
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.380			100.38	100	BM (RB)	0
	1.31			99.17	RBP	5
	1.270			99.11	RBWL	6
	.30 (1.57)			98.81	WD	11
	1.10 (2.37)			98.01	WD	16
	1.90 (3.17)			97.21	WD	21
	2.10 (3.37)			97.01	WD	26
		1.270		99.11	RBWL	31

This profile has taken from Neyyattinkara Sreekrishnaswamy Temple kadavu. The benchmark is the step of the Kadavu. It lies between $08^{\circ}24'07.0''$ N latitude and $077^{\circ}05'21.3''$ E longitude



PROFILE - 61
NEYYATTINKARA MUNICIPALITY
TBM: Step (Middle) of Sreekrishna Swami Temple Kadavu

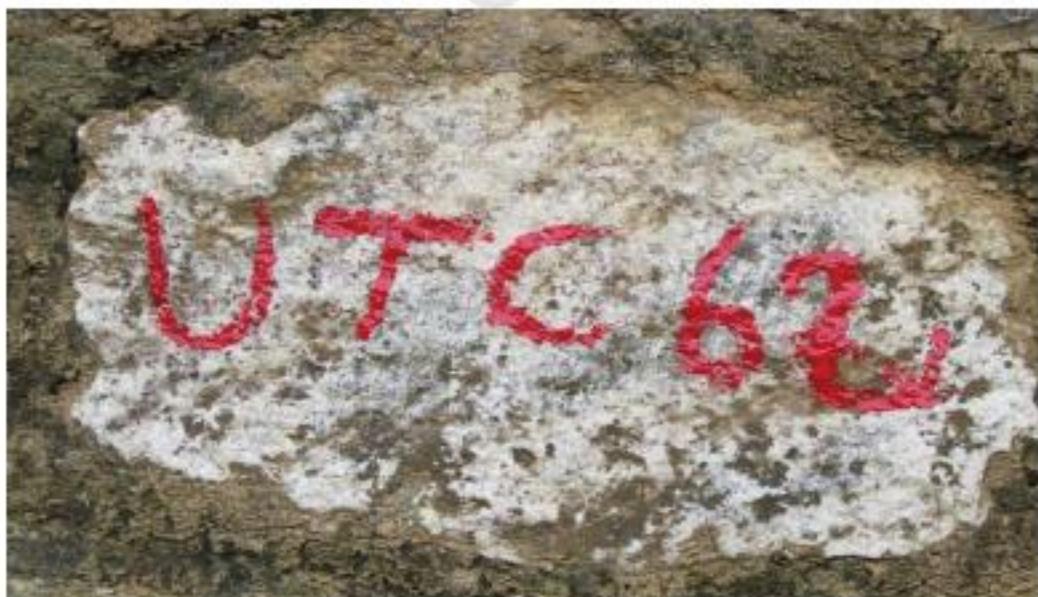


Profile 62

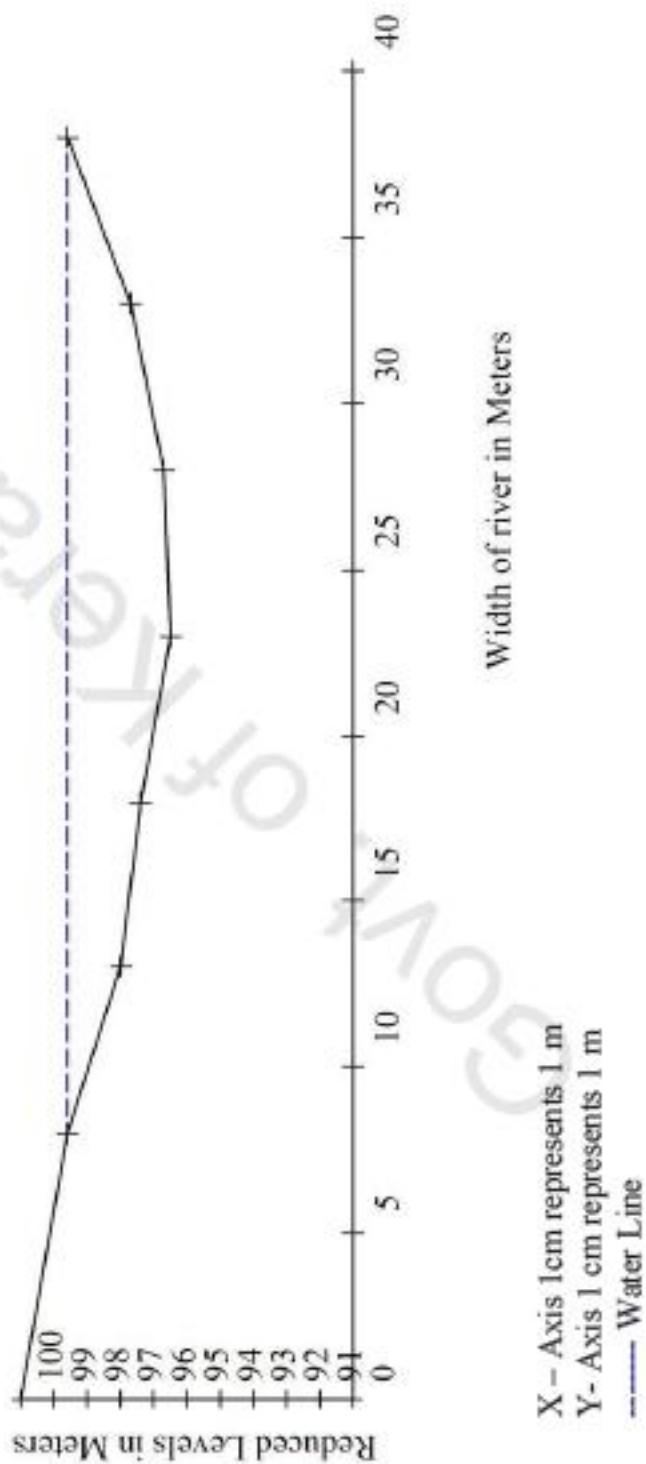
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.840			101.84	100	RBP	BM
1.305		3.25	99.895	98.59	CPI (WL)	8 m
	1.60 (2.905)			96.99	WD	13
	2.20 (3.505)			96.39	WD	18
	2.80 (4.4)			95.495	WD	23
	2.90 (4.2)			95.695	WD	28
	1.90 (3.205)			96.69	WD	33
	1.30			98.59	LBWL	38

This profile falls at 30m north of Palakkadavu bridge. The sidewall on the right bank is taken as benchmark which is in Rameswaram ward of Neyyattinkara Municipality. It lies between $08^{\circ}23'53.9''$ N latitude and $077^{\circ}05'37.7''$ E longitude



PROFILE - 62
NEYYATTINKARA MUNICIPALITY
TBM: Edge of construction on the right bank



Profile 63

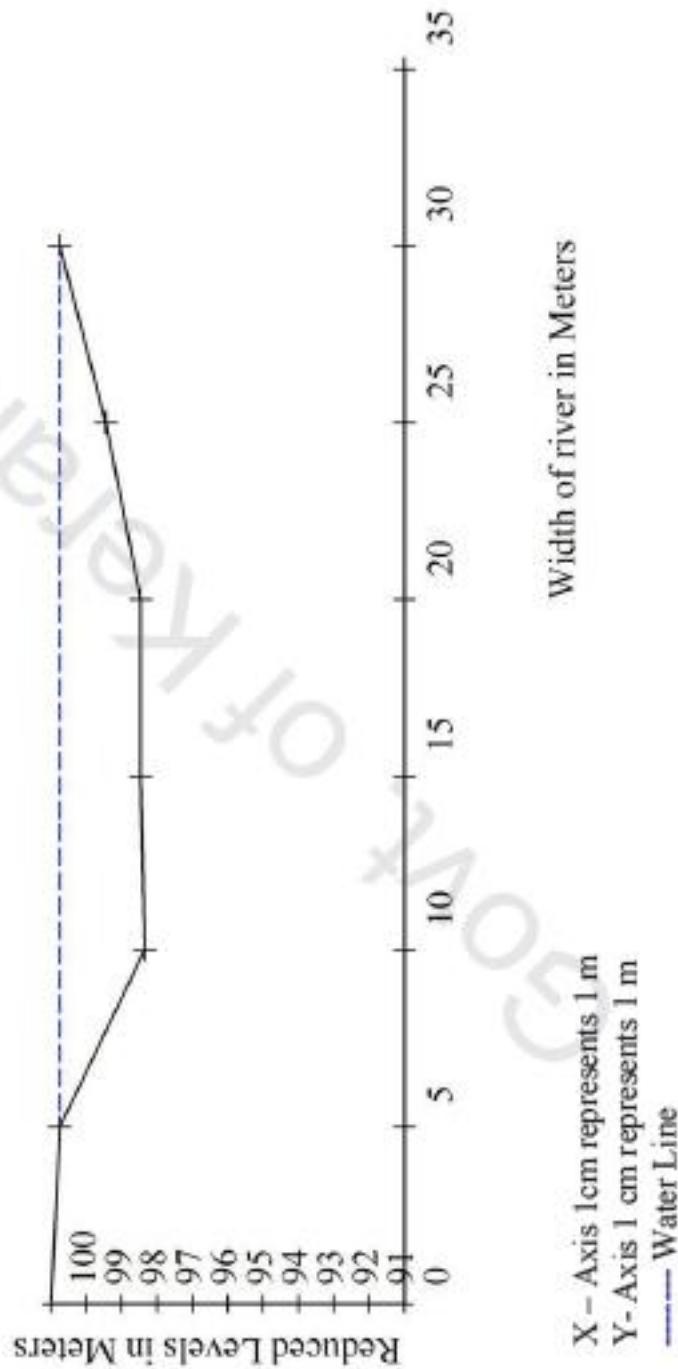
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.560			101.56	100	LBP (BM)	0
	1.80			99.76	LBWL	5
	2.40 (4.2)			97.36	WD	10
	2.30 (4.1)			97.46	WD	15
	2.30 (4.1)			97.46	WD	20
	1.30 (3.1)			98.46	WD	25
		1.80		99.76	RBWL	30

This profile falls at 200m south of Palakkadavu Bridge. Protection wall on the left bank is taken as benchmark which is in Krishnapuram ward of Neyyattinkara Municipality. It lies between $08^{\circ}23'46.3''$ N latitude and $077^{\circ}05'4.8''$ E longitude



PROFILE - 63
NEYATTINKARA MUNICIPALITY
TBM: Protection wall at Krishnapuram



Profile 64

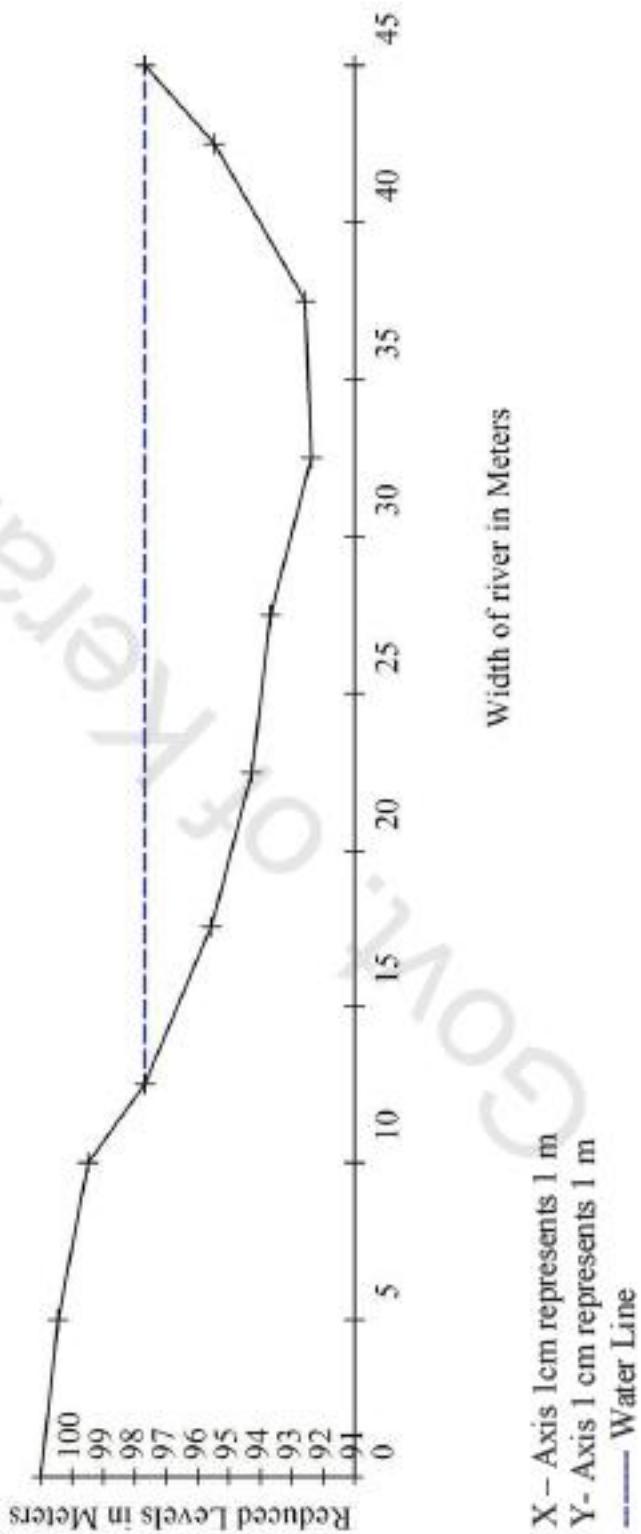
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.40			101.4	100	RBP (BM)	0
	1.945			99.45	RBP	5
	2.915			98.485	RBP	10
	4.720			96.68	RBWL	12.5
	2.10 (6.82)			94.58	WD	17.5
	3.40 (8.12)			93.28	WD	22.5
	4.00 (8.72)			92.68	WD	27.5
	5.30 (10.02)			91.38	WD	32.5
	5.10 (9.82)			91.58	WD	37.5
	2.20 (6.92)			94.48	WD	42.5
		4.720		96.68	LBWL	

This profile falls at Panavila ward of Neyyattinkara Municipality. An electric post on the left bank is taken as the benchmark. It lies between $08^{\circ}23'39.5''$ N latitude and $077^{\circ}05'42.5''$ E longitude



PROFILE - 64
NEYYATTINKARA MUNICIPALITY
TBM: Concrete wall on the right bank at Panavila Kadavu



Profile 65

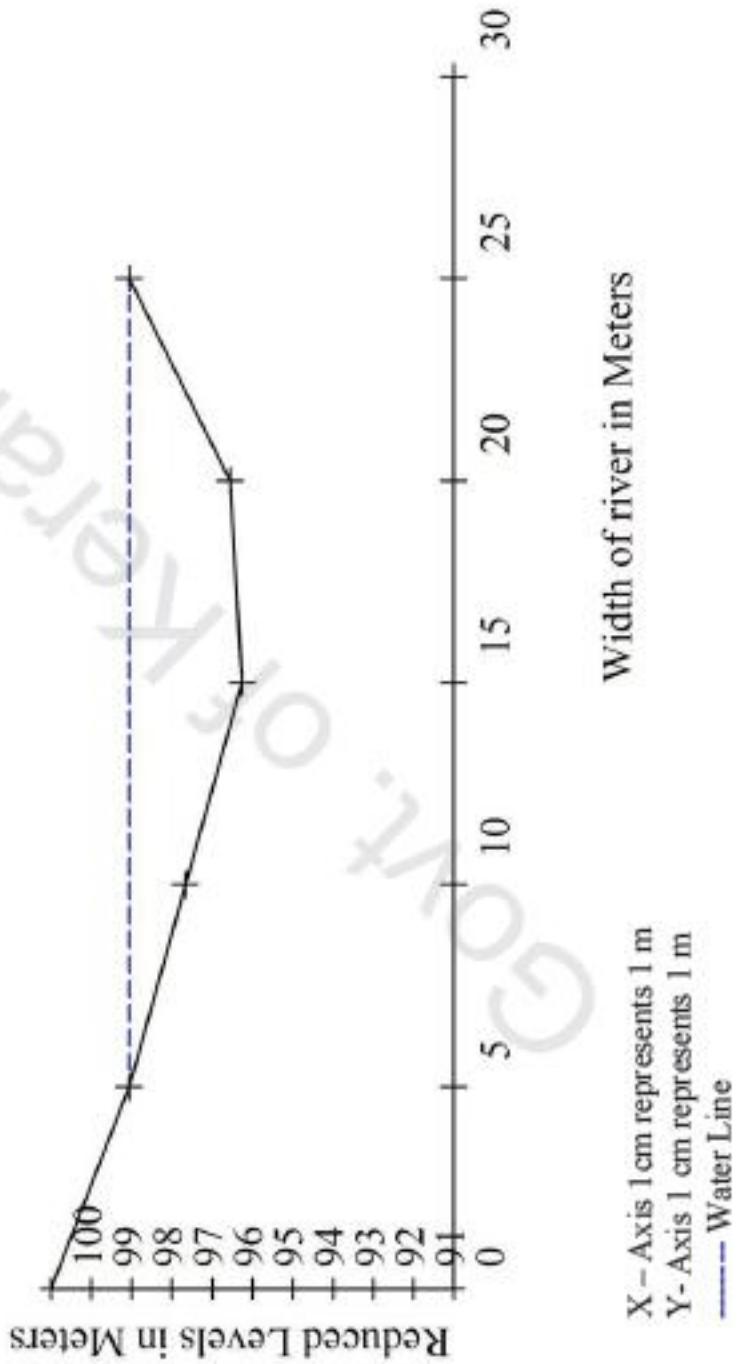
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.95			101.95	100	LBP	0
	3.89			98.06	LBWL	5
	1.10 (4.99)			96.66	WD	10
	2.80 (6.69)			95.26	WD	15
	2.50 (6.39)			95.56	WD	20
		3.89		98.06	RBP (BM)	25

This profile falls at north of Amaravila bridge where a rain gauging station is located. Lower part of KWA Pumphouse on the right bank is taken as bench mark It lies between $08^{\circ}23'31.3''$ N latitude and $077^{\circ}05'53.2.''$ E longitude



PROFILE - 65
NEYYATTINKARA MUNICIPALITY
TBM: KWA Water tank on the right bank



Profile 66

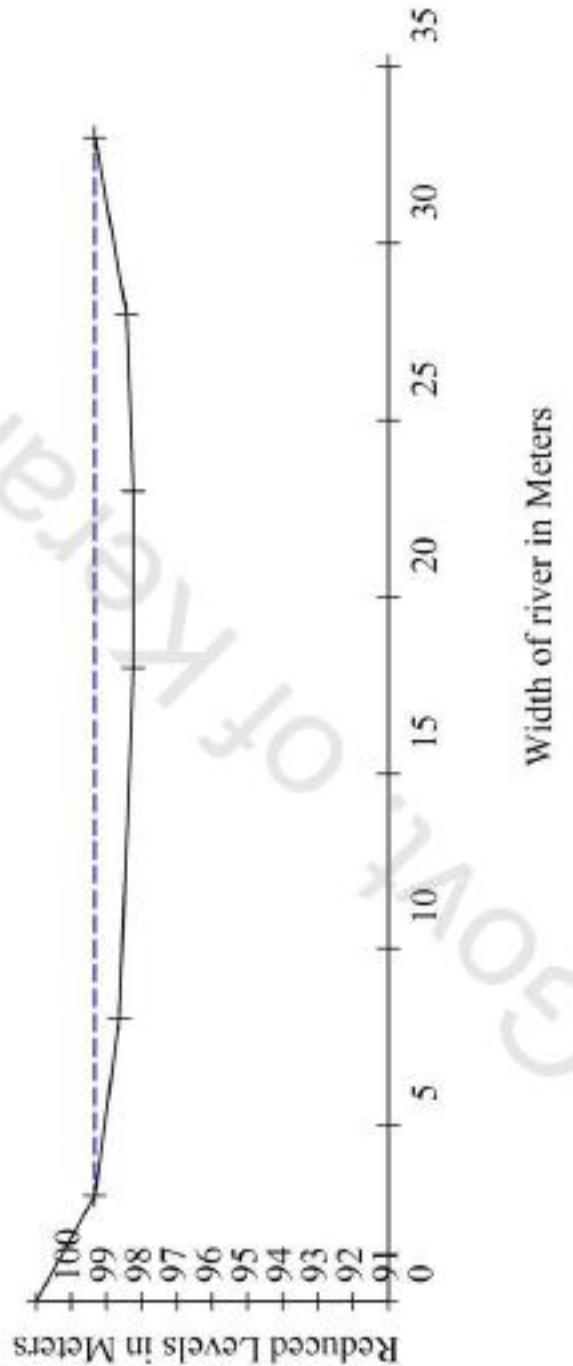
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.275			101.275	100	BMLB	0
	2.94			98.335	LBWL	3 m
	.70 (3.64)			97.635	WD	8
	1.10 (4.04)			97.235	WD	13
	1.10 (4.04)			97.235	WD	18
	1.10 (4.04)			97.235	WD	23
	.90 (3.84)			97.435	WD	28
		2.94		98.335	RDBL	33

This profile has been taken from Thonikkadavu south of Amaravila bridge. The protection wall on the left bank is taken as benchmark. It lies between $08^{\circ}23'20.8''$ N latitude and $077^{\circ}05'46.1''$ E longitude.



PROFILE - 66
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall on the left bank at Thonikkadavu



X - Axis 1cm represents 1 m
Y- Axis 1 cm represents 1 m
—— Water Line

Profile 67

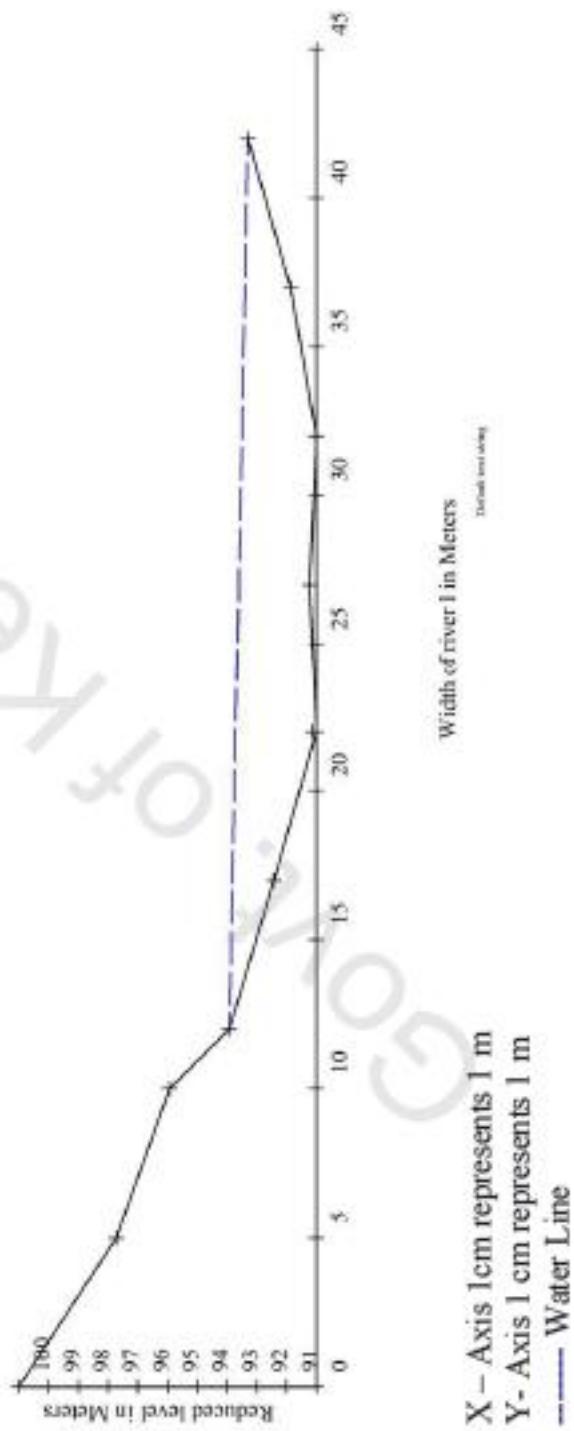
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.012		2.7	100.012	100	BM(LB)	0
0.0145		3.3	96.726	96.712	LBP(CP)	5
	1.78			94.9465	LBP	10
	3.8			92.926	LBWL	12
	1.50			91.426	WD	17
	2.80			90.126	WD	22
	3.20			89.726	WD	27
	2.90			90.026	WD	32
	2.10			90.826	WD	37
		3.80		92.926	RBWL	42

This profile falls at the Pullamoola kadavu of Neyyattinkara Municipality. The top part of protection wall on the right bank is taken as benchmark. It lies between $08^{\circ}23'15.5''$ N latitude and $077^{\circ}05'32.7''$ E longitude



PROFILE- 67
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall on the right bank



Profile 68

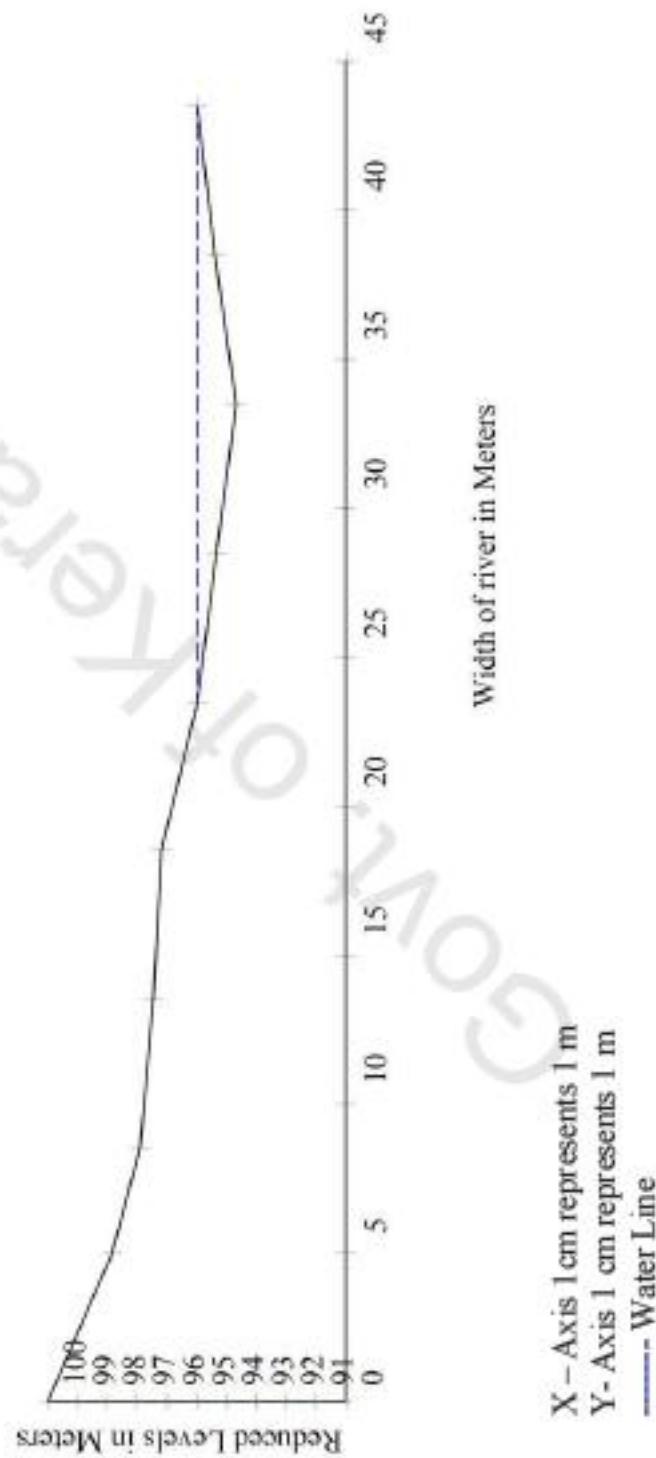
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.045		4.56	100.045	100	(CPI)	0
	2.205			97.84	LBP	5
	3.135			96.91	LBPBM	8.5
	3.58			96.465	LBP	13.5
1.705	3.855		94.895	96.19	LBP (P)	18.5
	2.9165			94.9845	LBWL	23.5
	.65 (3.51)			94.33	WD	28.5
	1.30 (4.2105)			94.68	WD	33.5
	.60 (3.51)			94.38	WD	38.5
		2.9105		94.9845	RBWL	43.5

This profile falls at Keezhkolla ward of Neyyattinkara Municipality. The protection wall on the left bank is taken as benchmark. It lies between $08^{\circ}23'0.6''$ N latitude and $077^{\circ}05'46.2.6''$ E longitude



PROFILE - 68
CHENKAL GRAMA PANCHAYAT
TBM: Protection wall on the left bank



Profile 69

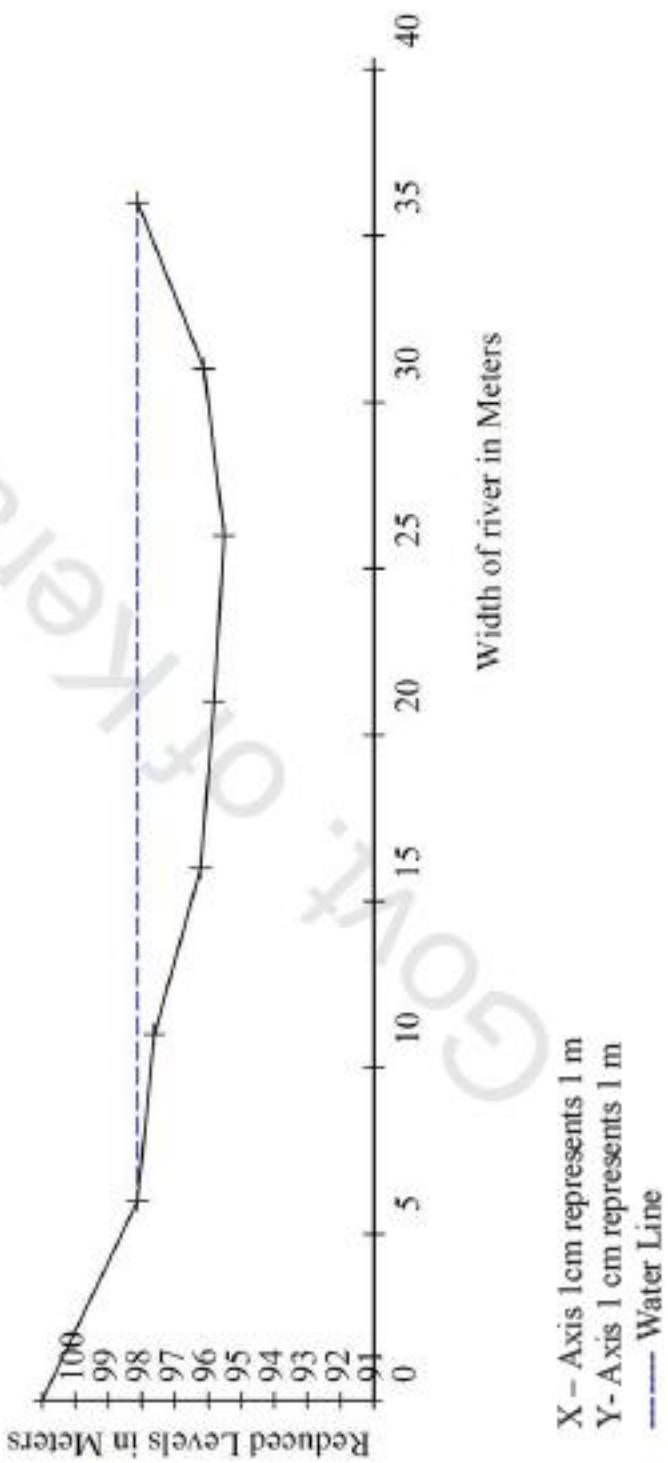
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.33				100	LBP (BM)	
0.205		4.93	100.205	100	PROFILE (BS,LAB)	0
	3.08			97.125	LBWL	6 m
	.50 (3.58)			96.625	WD	11
	1.90 (4.98)			95.225	WD	16
	2.30(5.38)			94.825	WD	21
	2.60 (5.68)			94.525	WD	26
	2 (5.08)			95.125	WD	31
				97.125	RBWL	36

This profile falls at Sabarimuttam Kadvu of Chenkal Panchayat A tree in the courtyard of house No.72 is taken as benchmark. It lies between $08^{\circ}23'00.9''$ N latitude and $077^{\circ}05'28.6''$ E longitude



PROFILE - 69
NEYYATTINKARA MUNICIPALITY
TBM: A tree on the left bank at Sabarimuttam kadavu



Profile 70

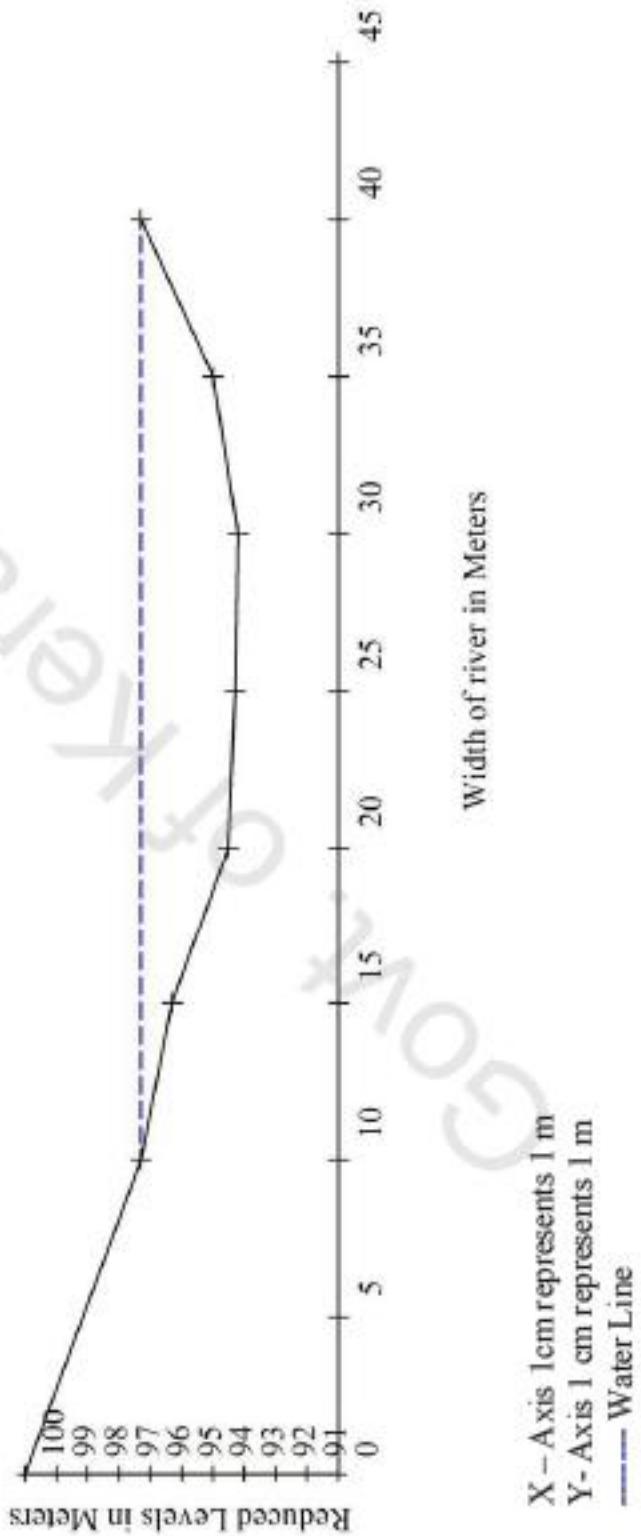
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.95				100	LBP (BM)	
0.23		2.95	100.23	100	CPI (LB)	
	0.93			96.3	LBWL	10 m
	1.0			95.3	WD	15
	2.80			93.5	WD	20
	3.00			93.3	WD	25
	3.10			93.2	WD	30
	2.30			94	WD	35
		3.93		96.3	RBWL	40

This profile falls at north of Pirayinmoodu bridge. Protection wall of the near plot on the right bank is taken as bench mark. It lies between $08^{\circ}22'50.'' N$ latitude and $077^{\circ}05'16.5.6'' E$ longitude



PROFILE - 70
NEYYATTINKARA MUNICIPALITY
TBM: Boundary Protection wall on the left bank



Profile 71

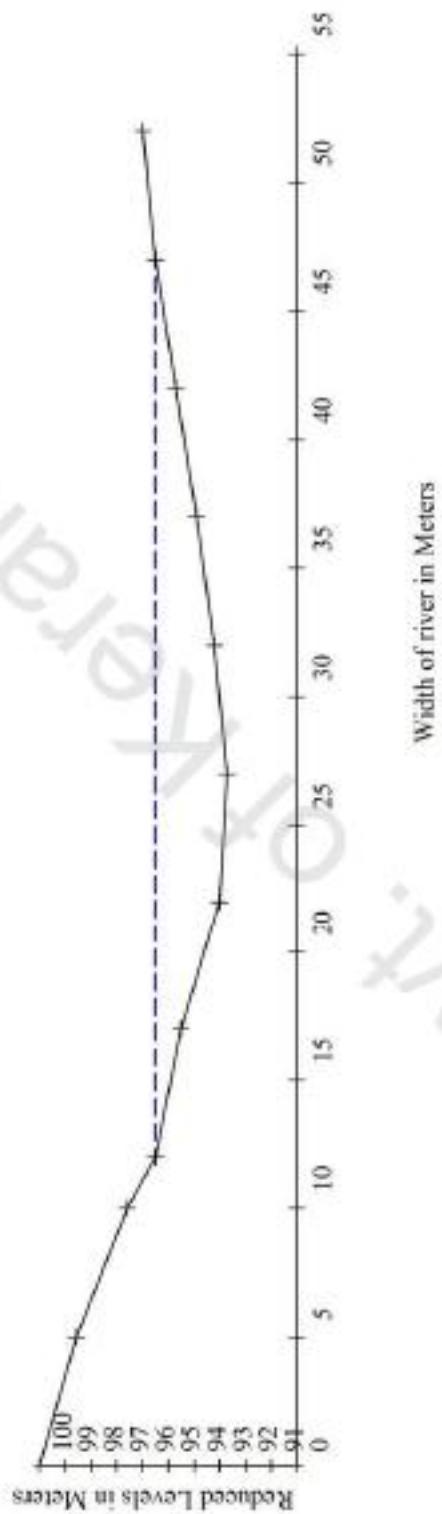
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
096			100.96	100	BM (RB)	0
	2.385			98.575	RBP	5
2.85		4.36	99.45	96.6	RBP (CPI)	10
	3.95			95.5	RBWL	12
	1.00			94.5	WD	17
	2.50			93	WD	22
	2.80			92.7	WD	27
	2.30			93.2	WD	32
	1.60			93.9	WD	37
	80			94.7	WD	42
	3.95			95.5	LBWL	47
		3.46		95.99	LBP	52

This profile falls at Pirayummoodu south of Pirayumode bridge.. Protection wall of the near plot on the right bank is taken as bench mark . It lies between $08^{\circ}22'32.6''$ N latitude and $077^{\circ}05'11.9''$ E longitude



PROFILE - 71
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall on the right bank



X - Axis 1 cm represents 1 m
Y - Axis 1 cm represents 1 m
— Water Line

Profile 72

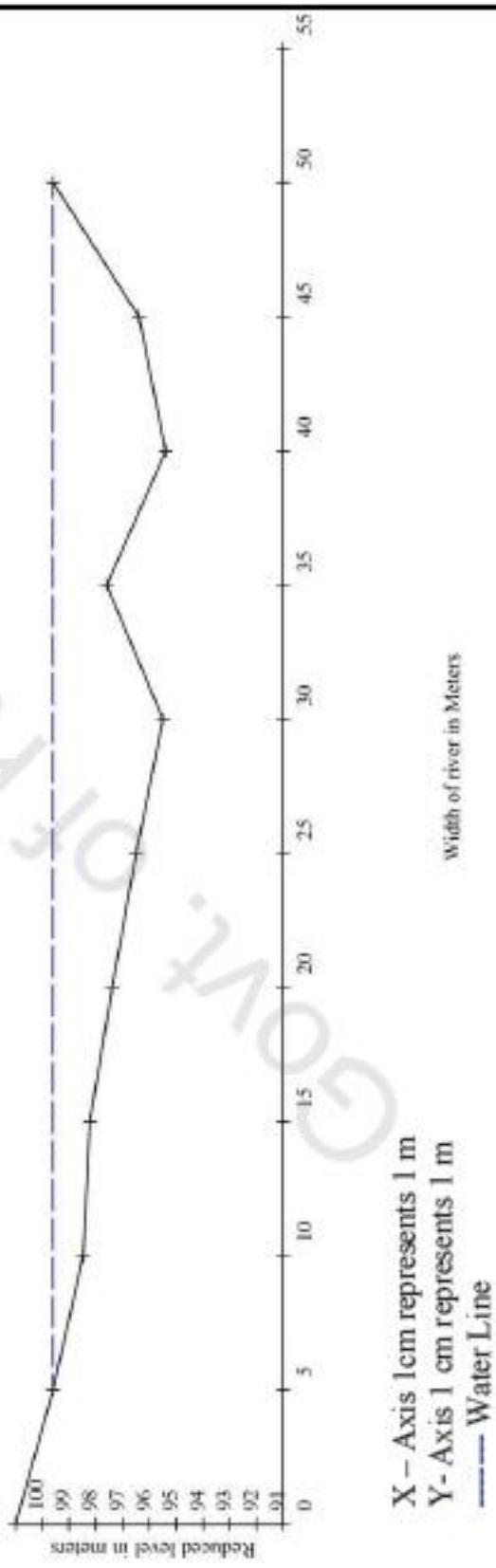
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.6			100.6	100	BM	0
	2.01			98.59	RBP	5
	1.110(3.12)			97.48	RBWL	10
	.90(3.11)			97.22	WD	15
	2.20(4.21)			96.39	WD	20
	3.10(5.11)			95.49	WD	25
	4.10(6.11)			94.49	WD	30
	2.10(4.11)			96.49	WD	35
	4.2(6.21)			94.39	WD	40
	3.20(5.21)			95.39	WD	45
		2.01		98.59	WD	50

This cross-section falls at the Kodithottathu Kadavu. Benchmark is marked on the protection wall on the right bank and is in Neyyattinkara Municipality. It lies between $08^{\circ}22'30.6''$ N latitude and $077^{\circ}05'0.82''$ E longitude



PROFILE-72
Neyyattinkara Municipality
TBM:Protection wall on the right bank at Kodithottathu kadavu

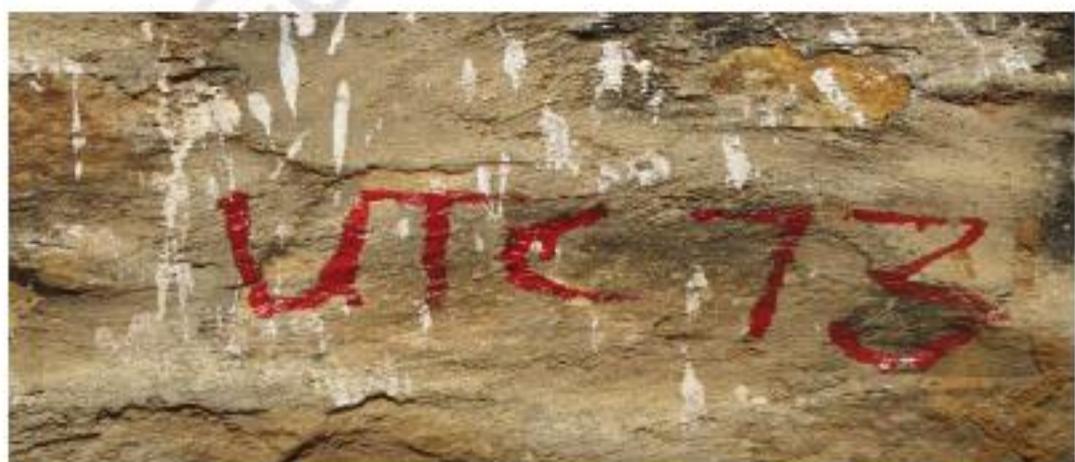


Profile 73

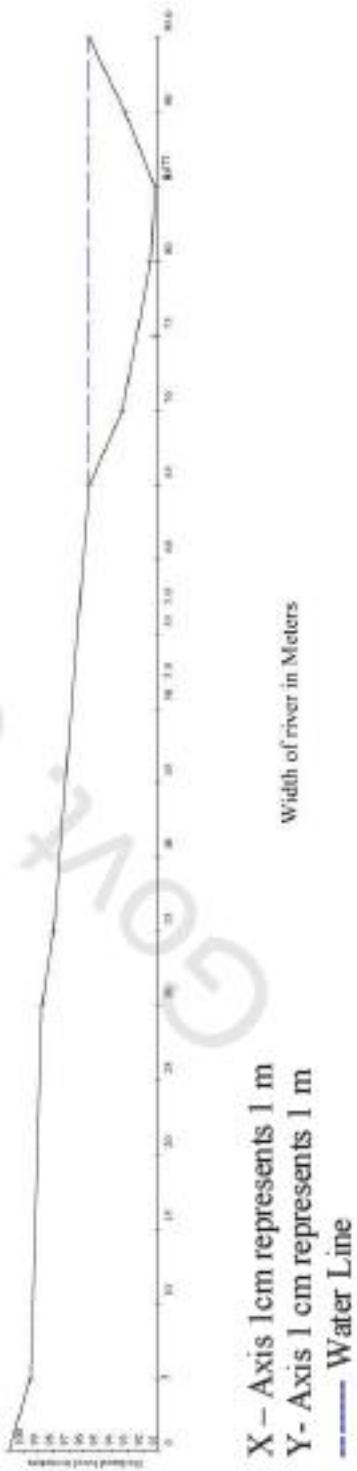
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.74			100.74	100	BM	0
	2.215			98.525	RBP	25
0.10		2.97	97.87	97.77	RBP	30
	0.80			97	RBP	35
	3.3			94.57	RBWL	65
	2.20(5.5)			92.37	WD	70
	4.30(7.6)			90.27	WD	75
	4.10(7.4)			90.47	WD	80
	4.40(7.7)			90.17	WD	85
	2.40(5.7)			92.17	WD	90
		3.30		97.57	LBWL	95

This profile falls at the Pathirasery Kadavu of Neyyattinkara Municipality. Compound wall of house is taken as bench mark. It lies between $08^{\circ}22'22.7''$ N latitude and $077^{\circ}05'12.6''$ E longitude



PROFILE-73
Neyyattinkara Municipality
Compound wall close to the road at Pathiriseri kadavu

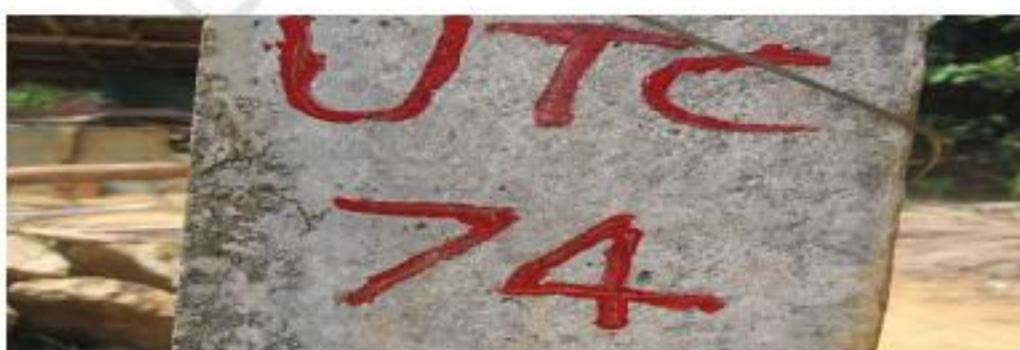


Profile 74

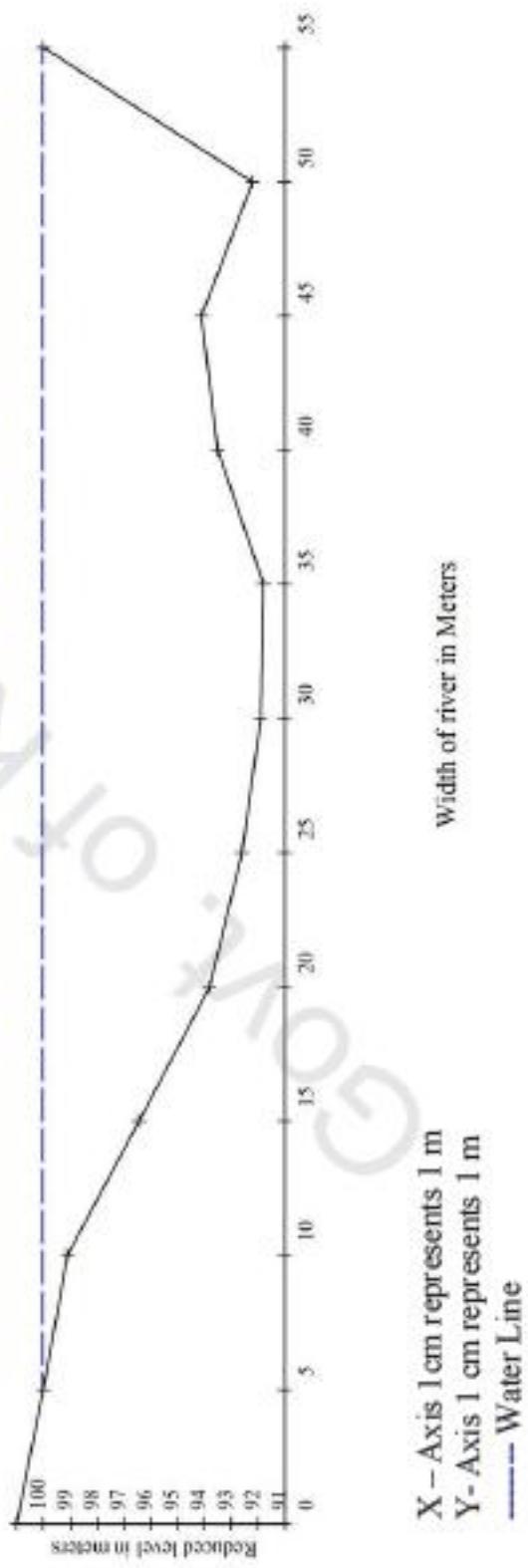
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.60			100.6	100	RBP	0
	1.60			99	RBWL	5
.90(2.5)				98.1	WD	10
4.0(5.16)				95.44	WD	15
6.2(7.8)				92.8	WD	20
7.4(9)				91.6	WD	25
8.1(9.7)				90.9	WD	30
8.2(9.8)				90.8	WD	35
6.5(8.1)				92.5	WD	40
5.9(7.5)				93.1	WD	45
7.8(9.4)				91.2	WD	50
6.9(8.5)	1.60			99	LBWL	55

This profile has taken from Valiamuttu kadavu. An electric post on the right bank(U/VV132) of Vlathankara ward of Chenkal Panchayat is taken as bench mark... It lies between $08^{\circ}22'10.1''$ N latitude and $077^{\circ}05'22.6''$ E longitude



PROFILE-74
Chenkai Panchayat
TBM: An electric post on the left bank at Valiyamuttu kadavu



Profile 75

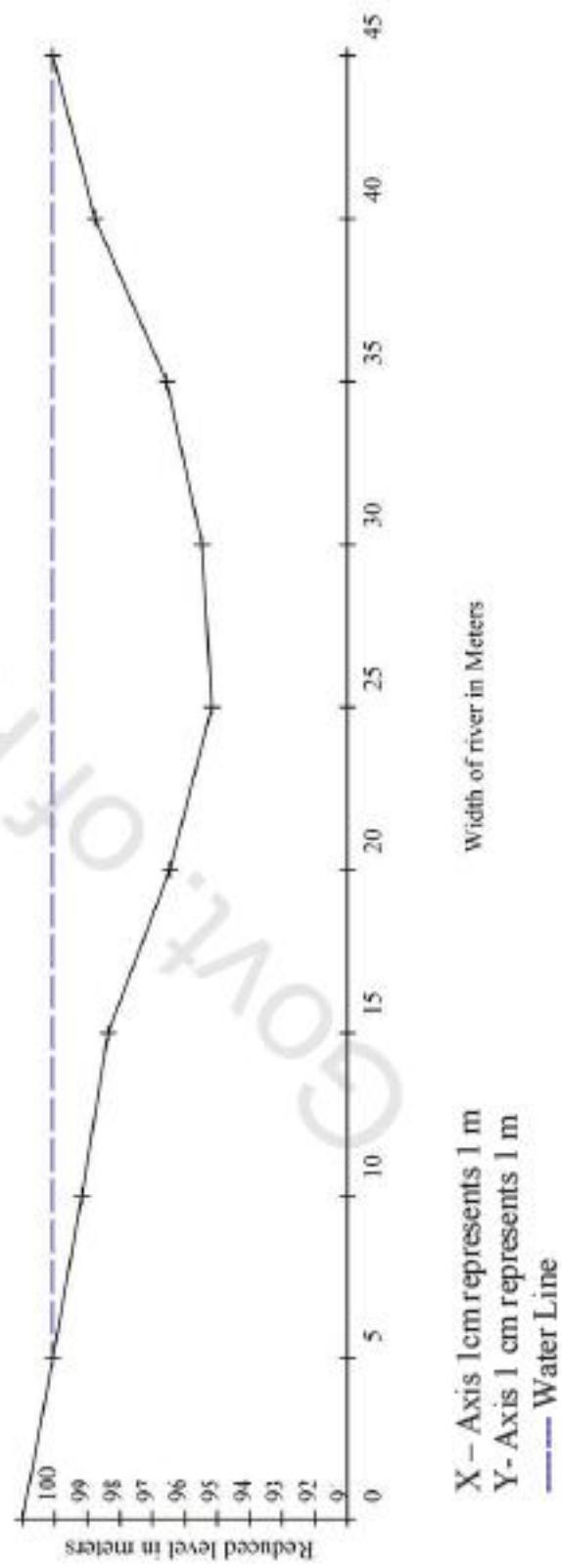
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.80			100.80	100	BM	0
	1.73			99.07	LBWL	5
	0.90(2.63)			98.17	WD	5(10)
	1.70(3.43)			97.37	WD	5(15)
	3.60(5.33)			95.47	WD	5(20)
	4.90(6.63)			94.17	WD	5(25)
	4.60(6.33)			94.47	WD	5(30)
	3.30(5.03)			95.77	WD	5(35)
	1.30(3.03)			97.77	WD	5(40)
		1.73		99.07	RBWL	5(45)

This river cross-section has taken from Kanjiramuttu Kadav Neyyattinkara Municipality .
The bench mark here is in the protection wall on right bank.



PROFILE - 75
CHENKAL GRAMA PANCHAYAT
TBM: Protection wall on the right bank at Kanjiramkulam Kadavu

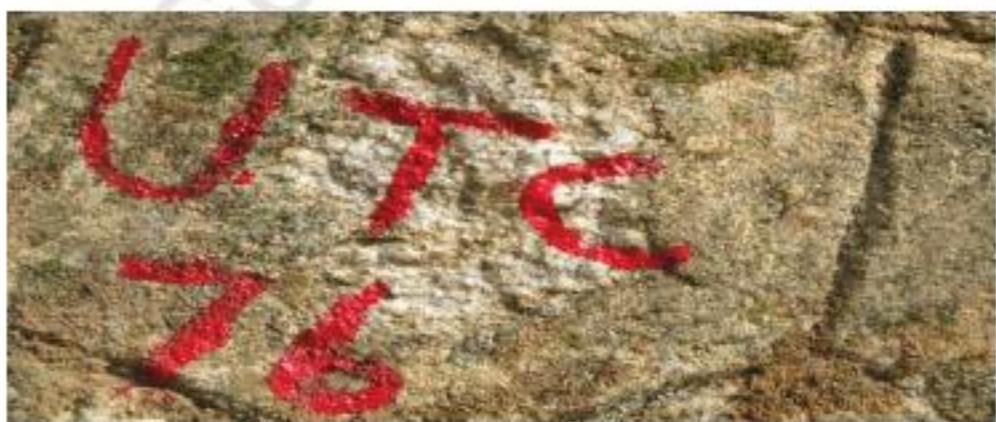


Profile 76

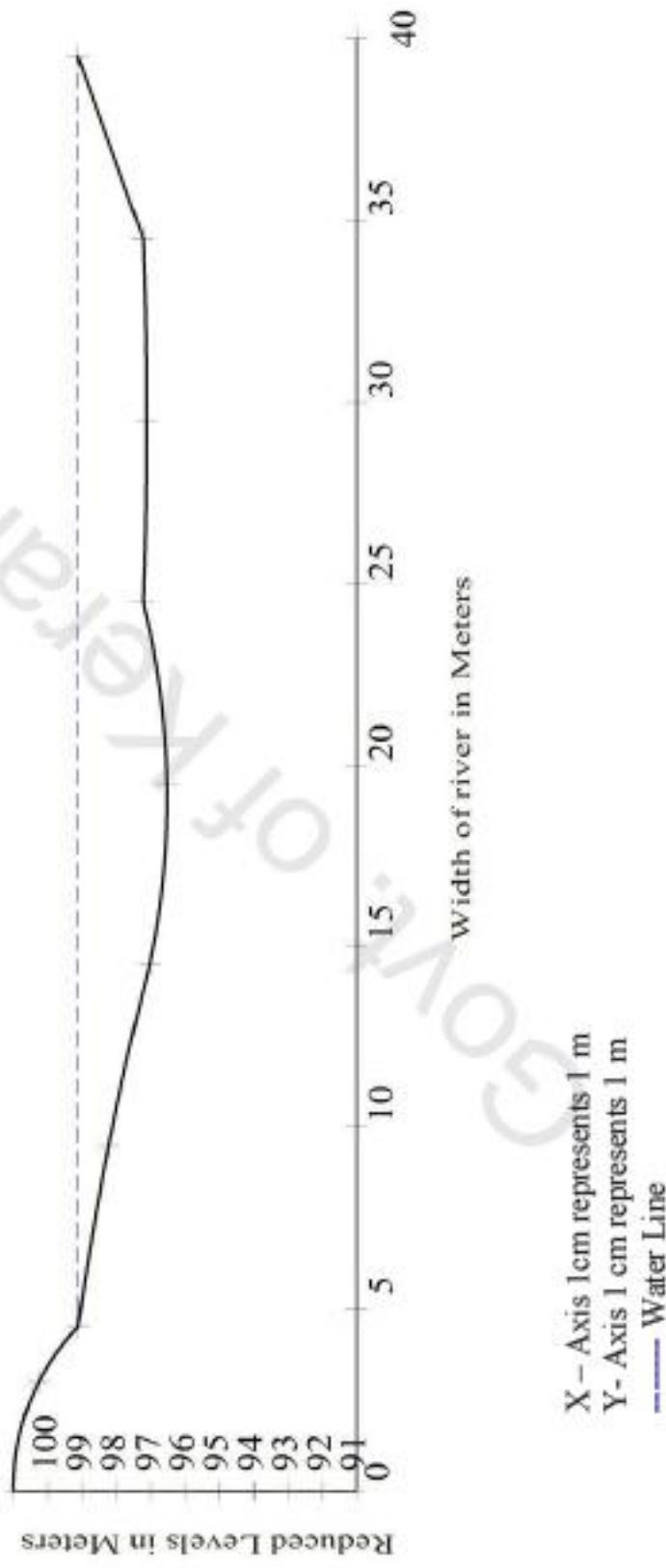
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.21			100.21	100	BM(RB)	0
		0.945		99.265	RBP	3 m
		2.085		98.125	RBWL	4.5
		.90 (2.985)		97.225	WD	9.5
		2.10 (4.185)		96.025	WD	14.5
		2.60 (4.685)		95.525	WD	19.5
		1.90 (3.985)		96.225	WD	24.5
		2.00 (4.085)		96.125	WD	29.5
		1.90 (3.985)		96.225	WD	34.5
		2.085		98.125	lBWl	39.5

The river cross-section at ThadalamNagaraja temple Kadavu of Kalumugham ward in ThirupuramPanchayat. Bench mark is in the temple protection wall on the right bank. It lies between $08^{\circ}21'58.0''$ N latitude to $077^{\circ}05'04.4''$ E longitude.



PROFILE - 76
NEYYATTINKARA MUNICIPALITY
TBM: Top part of side wall constructed near Aruvippuram temple.



Profile 77

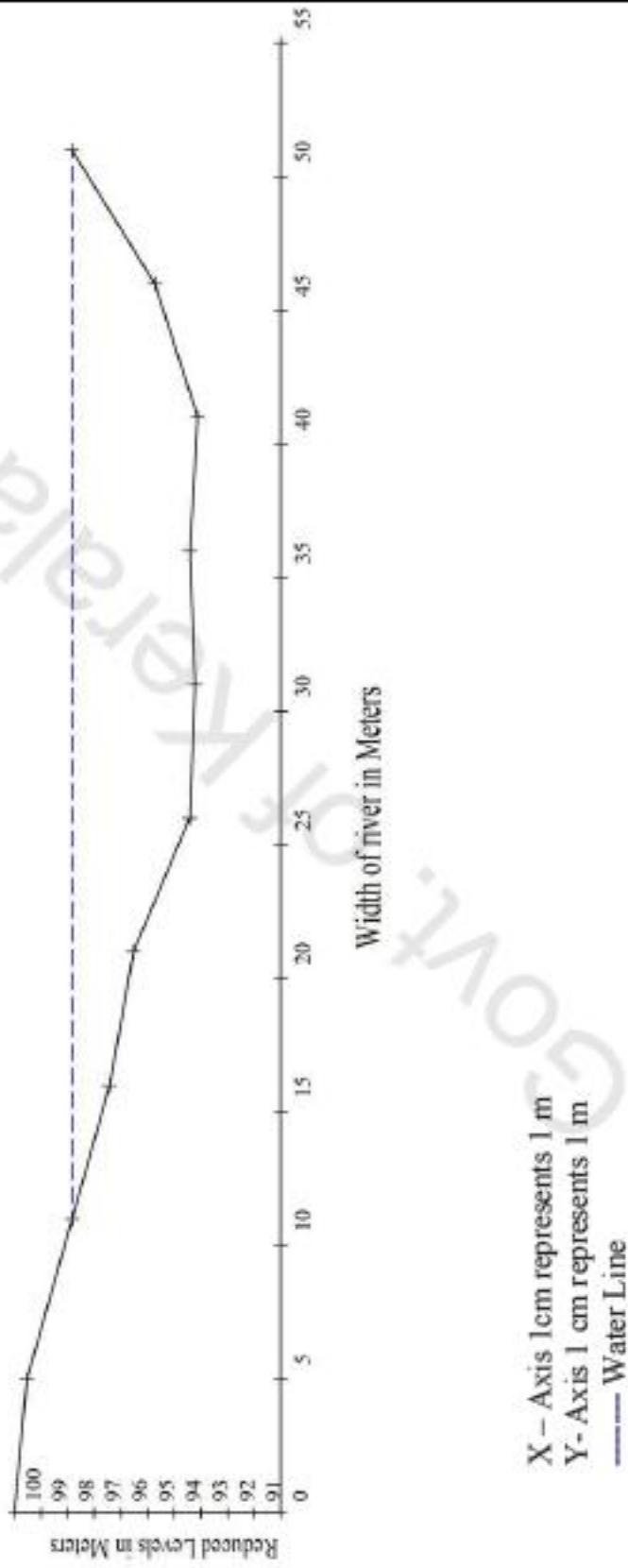
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.24			100.24	100	BM(RB)	0
	0.725			99.515	RBP	5
	2.415			97.825	RBWL	11
	1.40 (3.815)			96.425	WD	16
	2.30 (4.715)			95.525	WD	21
	4.40 (6.815)			93.425	WD	26
	4.60 (7.015)			93.225	WD	31
	4.40 (6.815)			93.425	WD	36
	4.70 (7.115)			93.125	WD	41
	3.10 (5.515)			94.725	IBW1	46
	2.415			97.825		51

The current river cross-section falls at Panchikadukadavu of Mannankallu ward in Thirupuram Pancayat. It lies between $08^{\circ}21'41.8''$ N latitude and $077^{\circ}04'58.4''$ E longitude. The Benchmark is at the protection wall on the right bank



PROFILE - 77
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall on the right bank



Profile 78

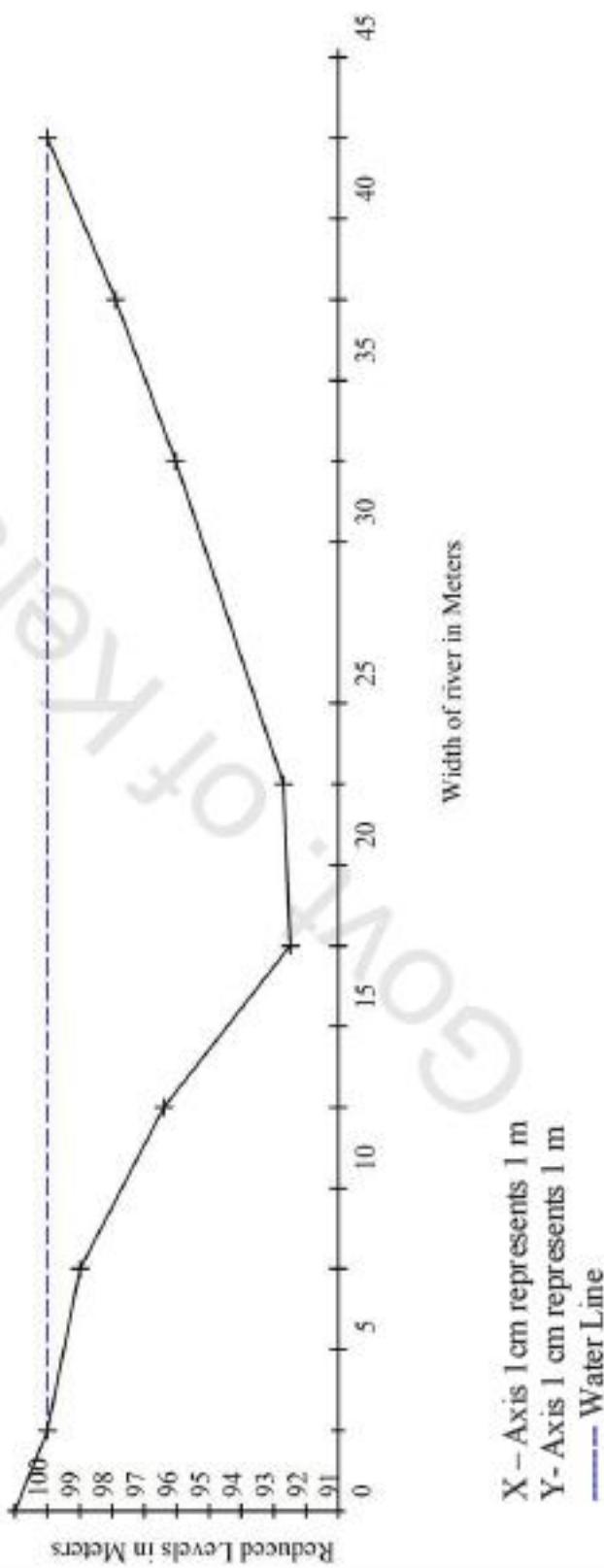
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.335			101.335	100	BM (RB)	0
	2.35			98.985	RBWL	2.5
	1.00 (3.35)			97.985	WD	7.5
	3.60 (5.95)			95.385	WD	12.5
	7.50 (9.85)			91.485	WD	17.5
	7.30 (9.65)			91.685	WD	22.5
	5.90 (8.25)			93.085	WD	27.5
	4.00 (6.35)			95.035	WD	32.5
	2.10 (4.45)			96.885	WD	37.5
		2.35		98.985	WL (LB)	42.5

The present river cross-section falls at the Pannichanikadavu of Mannankallu ward in Thirupuram Panchayat. It lies between $08^{\circ}21'36.5''$ N latitude and $077^{\circ}05'01.3''$ E longitude. The protection wall on the left bank is taken as benchmark.



PROFILE - 78
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall on the left bank



Profile 79

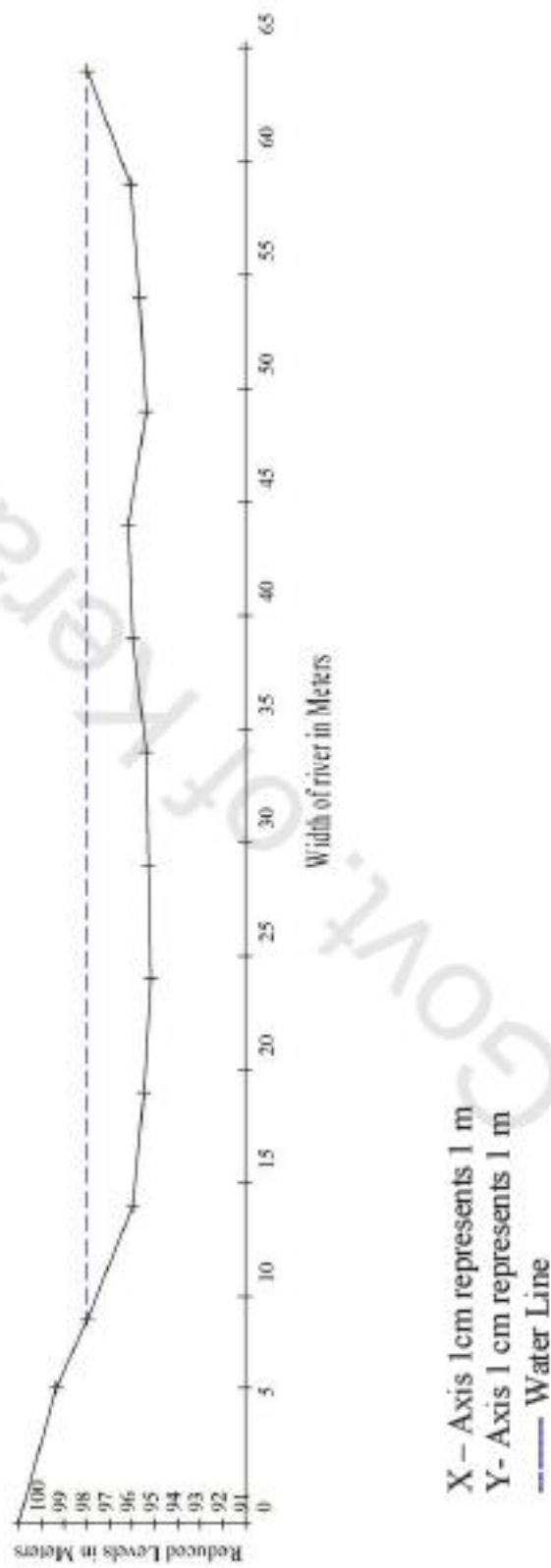
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.09			100.09	100	RBP	0
	1.76	3.985		98.33	RB (BM)	6 m
	3.12			96.97	RBWL	9
	2.00 (5.12)			94.97	WD	14
	2.50 (5.62)			94.47	WD	19
	2.80 (5.92)			94.17	WD	24
	2.70 (5.82)			94.27	WD	29
	2.60 (5.72)			94.37	WD	34
	2.00 (5.12)			94.97	WD	39
	1.80 (4.92)			95.17	WD	44
	2.60 (5.72)			94.37	WD	49
	2.30 (5.42)			94.67	WD	54
	1.90 (5.02)			95.07	WD	59
	3.12			96.97	LBWL	64

The present river cross section falls at the Erayinvilakadavu of Thirupuram Panchayat. The benchmark is at the side of protection wall to kadavu. It lies between $08^{\circ}21'28.7''$ N latitude $077^{\circ}05'08.1''$ E longitude.



PROFILE - 79
NEYYATTINKARA MUNICIPALITY
TBM: Protection wall on the right bank

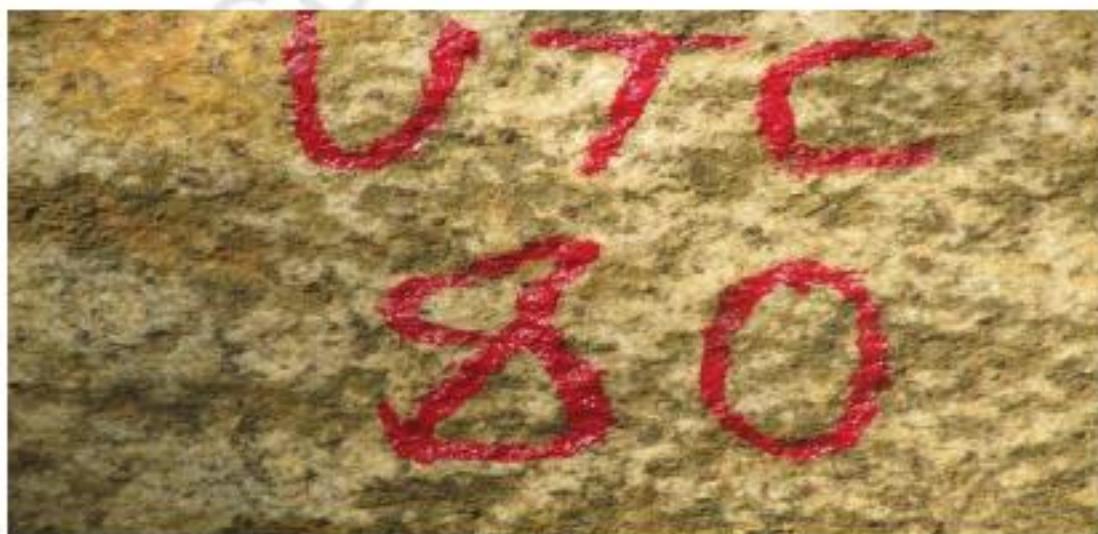


Profile 80

Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.04		3.60	101.04	100	BM (RB)	0
	1.24			99.8	RBP	5
	1.39			99.65	RBP	10
	4.82			96.22	RBWL	16.5
	4.60 (9.42)			91.62	WD	21.5
	4.70 (9.52)			91.88	WD	26.5
	3.40 (8.22)			92.82	WD	31.5
	1.70 (6.52)			94.88	WD	36.5
	4.82			96.22	LBWL	41.5

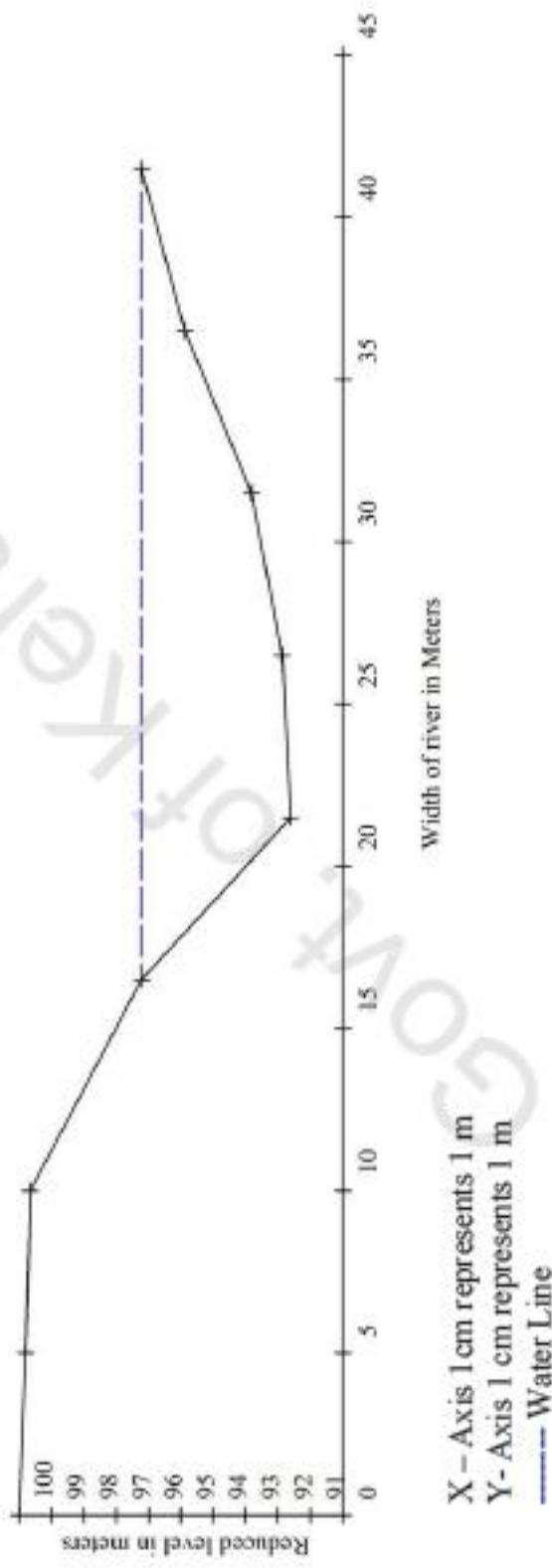
The current river cross-section is at the Mannankallu ward of Thirupuram Panchayat. The benchmark is concrete protection wall on the right bank of the river. It lies between $08^{\circ}21'14.9''$ N latitude $077^{\circ}05'15.1''$ E longitude.



PROFILE-80

THIRUPURAM GRAMA PANCHAYAT

TBM:Protection wall constructed on the right bank

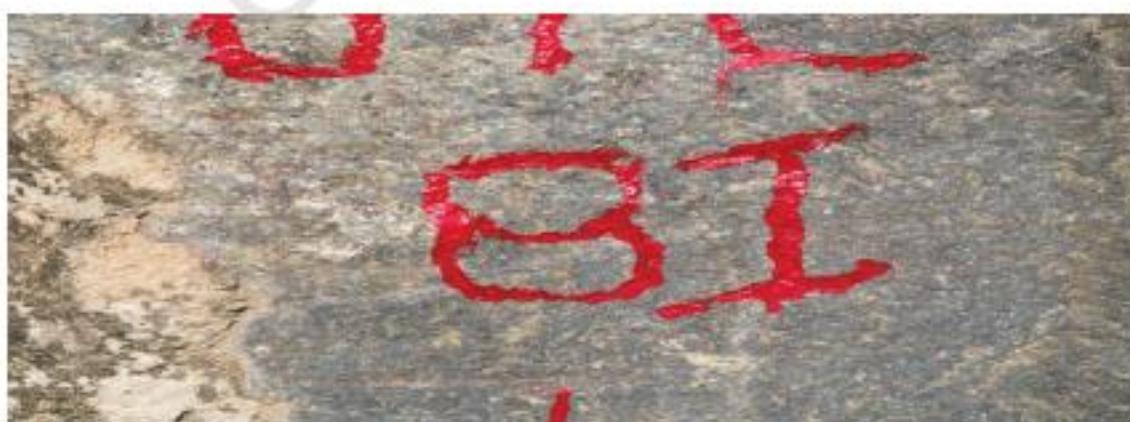


Profile 81

Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.2			100.2	100	BM (RB)	0
	3.46			96.74	RBWL	5
	1.50 (4.96)			95.24	WD	10
	2.40 (5.86)			94.34	WD	15
	4.80 (8.26)			91.94	WD	20
	6.10 (9.56)			90.94	WD	25
	5.80 (9.26)			90.94	WD	30
	6.80 (10.26)			89.6	WD	35
	5.80 (9.26)			90.94	WD	40
	5.30 (8.76)			91.44	WD	45
		2.46		96.74	LBL	50

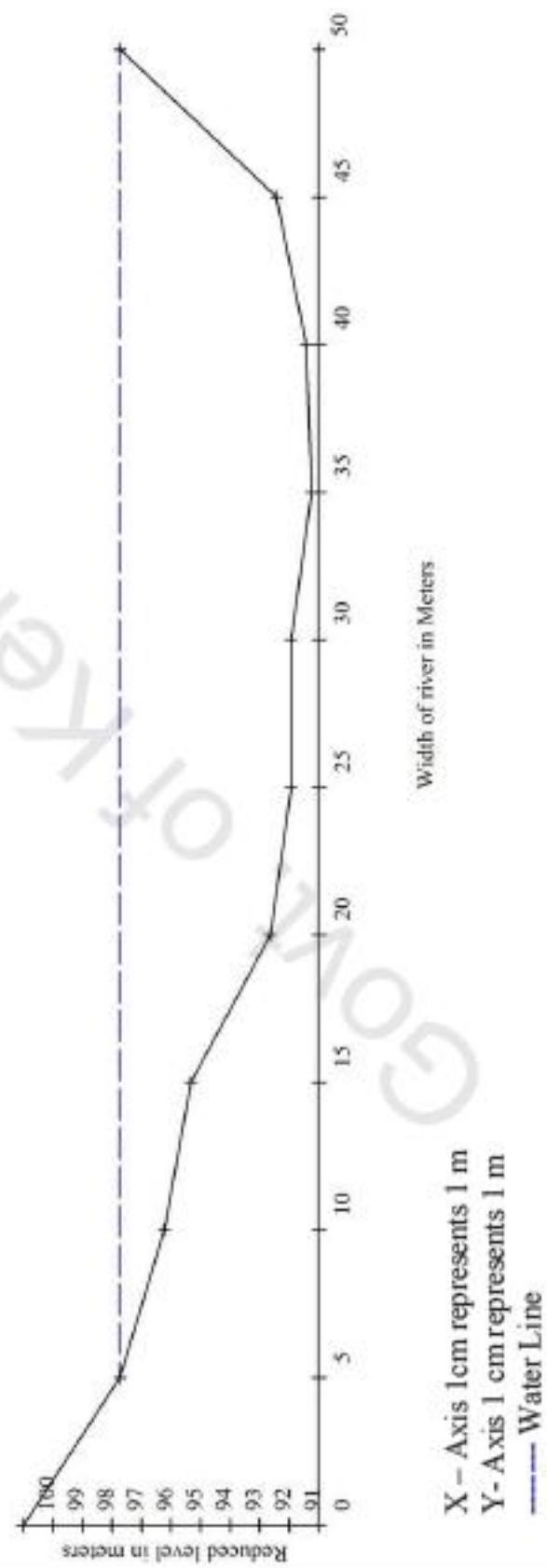
The present river cross section is falls at the Kurumanalkadavu of Mannankallu ward in Thirupuram Panchayat. It lies between $08^{\circ}21'06.4''$ N latitude and $077^{\circ}05'13''$ E longitude. The protection wall of the river on the right bank is taken as the bench mark.



PROFILE-81

THIRUPURAM GRAMA PANCHAYAT

TBM: Protection wall constructed on the right bank



Profile 82

Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.94			100.94	100	BM (RB)	0
	2.50			98.44	RBP	5
	3.225			97.715	RBP	10
	3.510			97.43	RBP	15
1.240		3.700	98.48	97.24	RBPC	20
	2.57			95.91	RBWE	24
	1.70 (WD) (4.27)			94.21		29
	4.00 (WD) (6.57)			91.91		34
	4.50 (WD) (7.07)			91.41		39
	5.10 (WD) (7.67)			90.81		44
	4.30 (WD) (6.87)			91.61		49
	3.00 (WD) (5.57)			92.91		54
	2.60 (WD) (5.17)			93.31		51
	060 (WD) (3.17)			95.31		64
	2.57			95.91		65
		2.10		96.27		

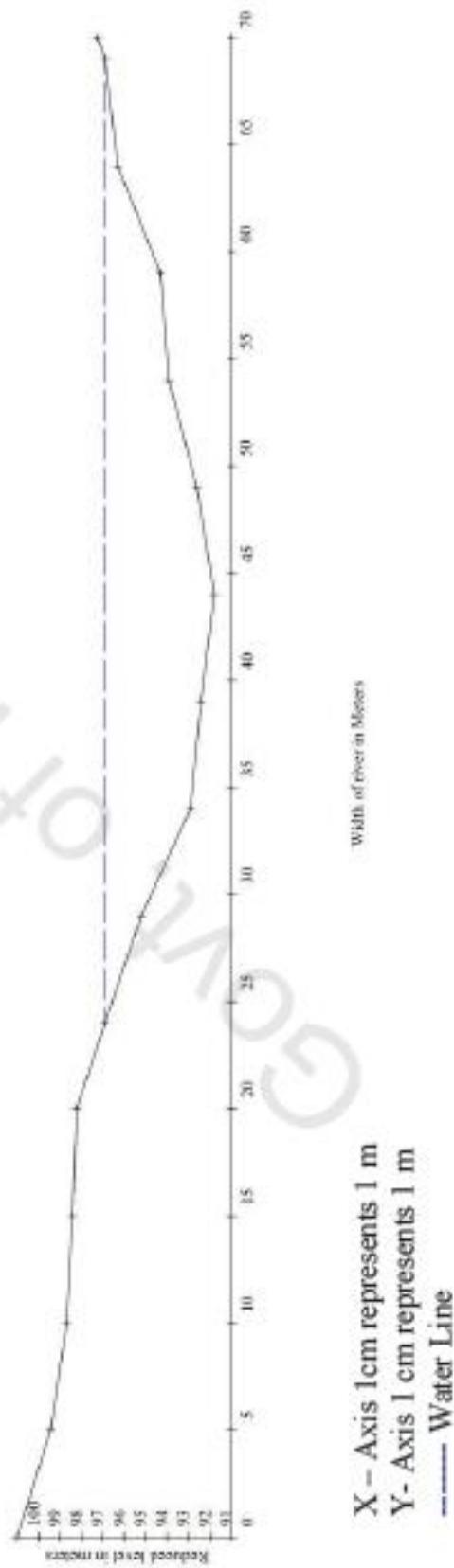
This river cross-section taken from ward no. 7 of Thirupuram Panchaya. Bench mark is the sidewall on the right bank of the river. A house (house No. 64) is near to the bench mark and the name of house owner is Ravi. It lies between $08^{\circ}20'50.2''$ N latitude and $077^{\circ}05'15.9''$ E longitude



PROFILE-82

THIRUPURAM GRAMA PANCHAYAT

TBM-Side wall of road on the right bank



Profile 83

Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
0.990		1.64	100.99	100	RBP	0
0.5		4.880	96.61	96.11	RBP	40 m
		1.415		95.16	RB	58
		2.390		94.22	RBWE	67.5
		1.00 (3.39)		93.22		70.5
		3.10 (5.49)		91.12		75.5
		3.50 (5.89)		90.72		80.5
		3.80 (6.19)		90.42		85.5
		3.90 (6.29)		89.82		90.5
		3.80 (6.19)		90.42		95.5
	2.90	5.29		91.32		100.5
			2.390	94.22	LBWE	105.5

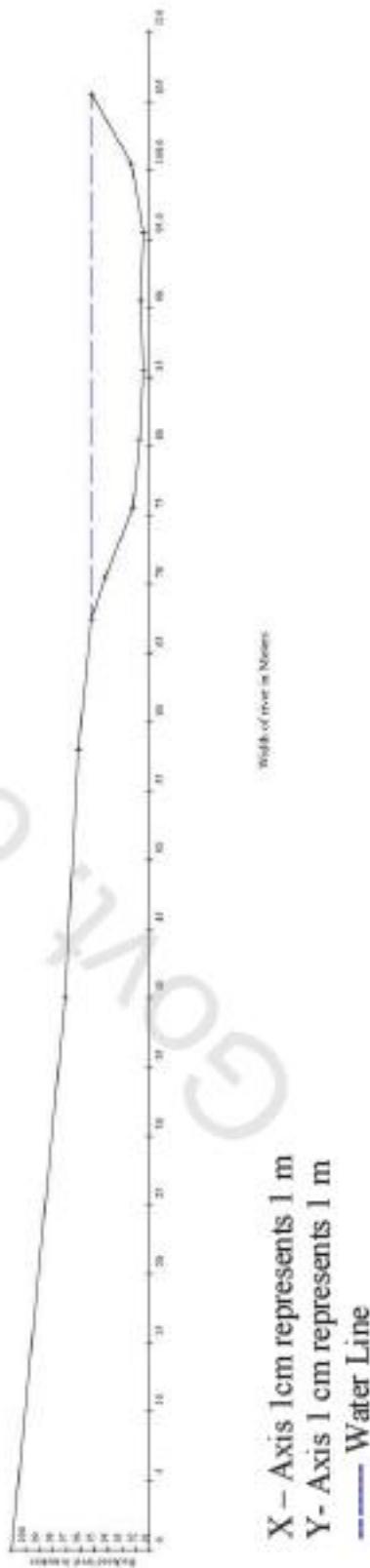
This profile of the river falls at the Mavilakkadavu of Thirupuram Panchayat .Right bank side wall of the river is taken as bench mark. It lies between $08^{\circ}20'42.3''$ and $077^{\circ}05'17.2''$ E longitude



PROFILE-83

THIRUPURAM GRAMA PANCHAYAT

TBM Side wall on the right bank



Profile 84

Field Book

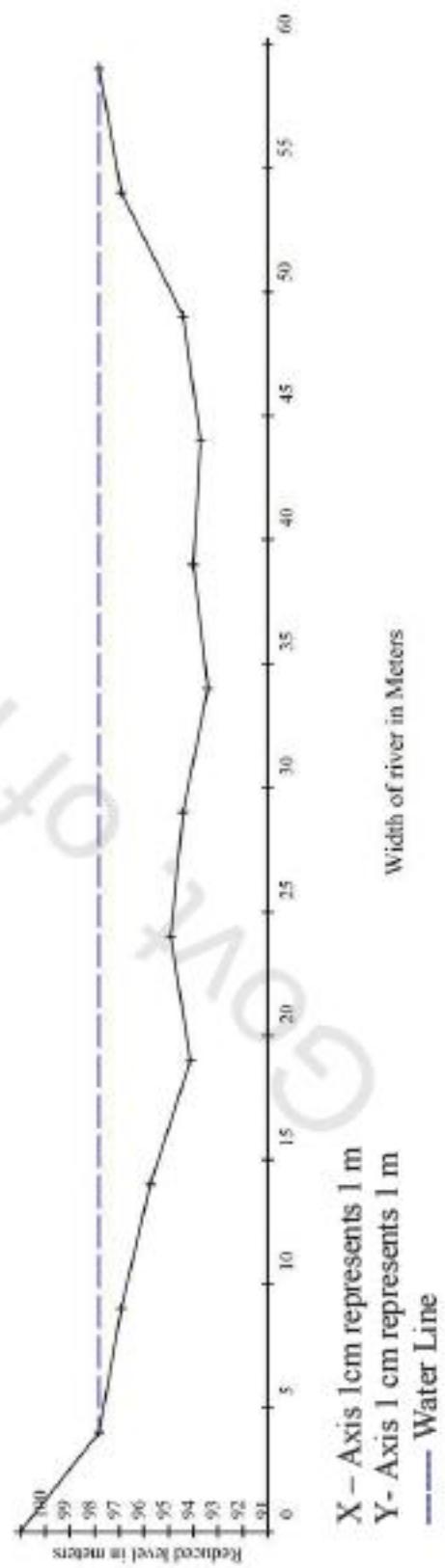
BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.55		4.85	101.55	100	RBP (BM)	0
	4.730			96.82	RBWE	4
	0.90 (5.63)			95.92	WD	9
	2.10 (6.8)			94.75	WD	14
	2.70 (7.43)			93.12	WD	19
	2.90 (7.63)			93.92	WD	24
	3.40 (8.13)			93.42	WD	29
	4.10 (9.13)			92.42	WD	34
	3.80 (8.53)			93.02	WD	39
	4.10 (8.83)			92.72	WD	44
	3.40 (8.13)			93.12	WD	49
	0.90 (5.63)			95.92	WD	54
		4.730		96.82	LBWE	59

The present cross-section falls in the Thirupuram Panchayat. The bench mark is the water tank away from Mavilakkadavu bridge. It lies between $08^{\circ}20'32.1''$ N latitude and $77^{\circ}05'21.8''$ E longitude.



PROFILE-84

THIRUPURAM GRAMA PANCHAYAT
TBM: Irrigation Water tank on the right bank



Profile 85

Field Book

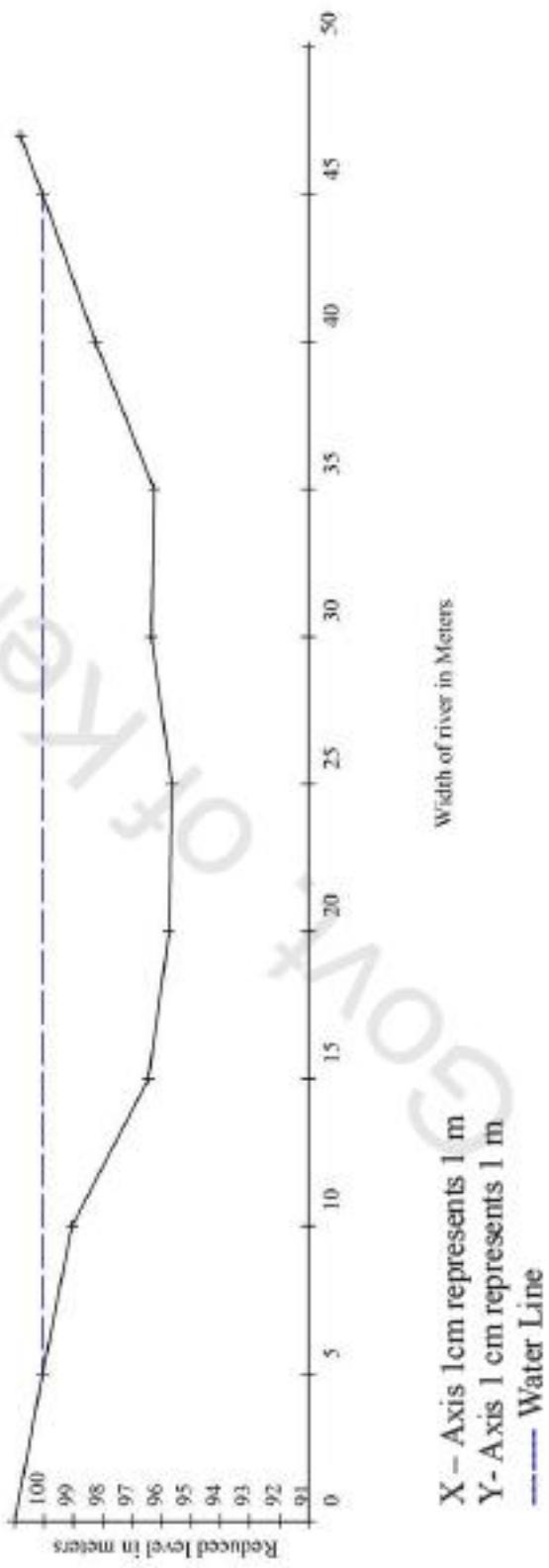
BS	IS	FS	HI	RL	REMARKS	DISTANCE
3.52			103.52	100	BM(LB)	0
	4.47			99.65	LBWE	5
	1.00 (5.47)			98.05	WD	10
	3.60 (8.07)			95.45	WD	15
	4.30 (8.77)			94.75	WD	20
	4.40 (8.87)			94.65	WD	25
	3.70 (8.17)			95.35	WD	30
	3.80 (8.27)			95.25	WD	35
	1.80 (6.27)			97.25	WD	40
	4.47			99.05	RBWE	45
		2.715		100.805		47

This cross-section falls at the ward No. 19 of Kulathoor Panchayat. The bench mark is at the sidewall constructed on the left banks of the river. It lies between $08^{\circ}20'23.9''$ N latitude to $77^{\circ}05'21.8''$ E longitude.



PROFILE-85

KULATHOOR GRAMA PANCHAYAT
TBM: Edge of protection wall on right bank



X - Axis 1cm represents 1 m
Y - Axis 1 cm represents 1 m
— Water Line

Profile 86

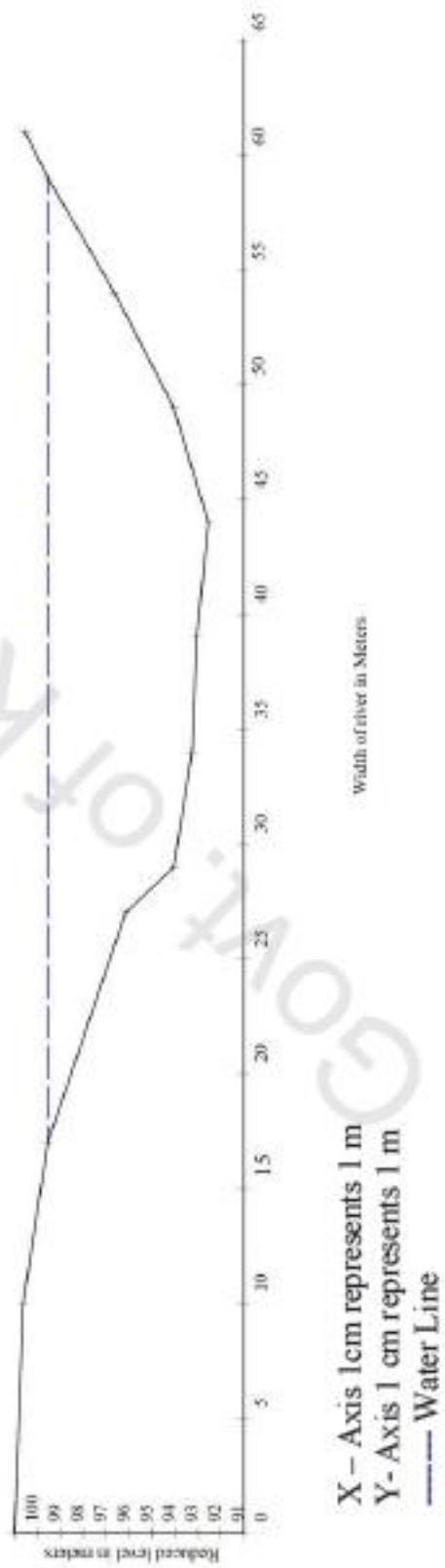
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.09			101.09	100	LB	0
	1.465			99.625	LBP	5
	2.545			98.545	LBWL	10
	1.70 (4.245)			96.845	WD	17
	3.40 (5.945)			95.145	WD	22
	5.50 (8.045)			93.045	WD	27
	6.30 (8.845)			92.245	WD	29
	6.50 (9.045)			92.045	WD	34
	7.00 (9.545)			91.545	WD	39
	5.50 (8.045)			93.045	WD	44
	2.90 (5.445)			95.645	WD	49
	2.545			98.545	RBWL	54
		1.535		99.56	RBP	59
						61

The current cross-section falls at Kottakkakam ward of Kulathoor Panchayat at Korukalkadavu. The bench mark is the side wall constructed on the left bank of the river. It lies between $08^{\circ}20'11.9''$ N latitude and $077^{\circ}05'09.3''$ E longitude



PROFILE-86
KULATHOOR GRAMA PANCHAYAT
TBM, Protection wall at Korukal kadavu on the right bank

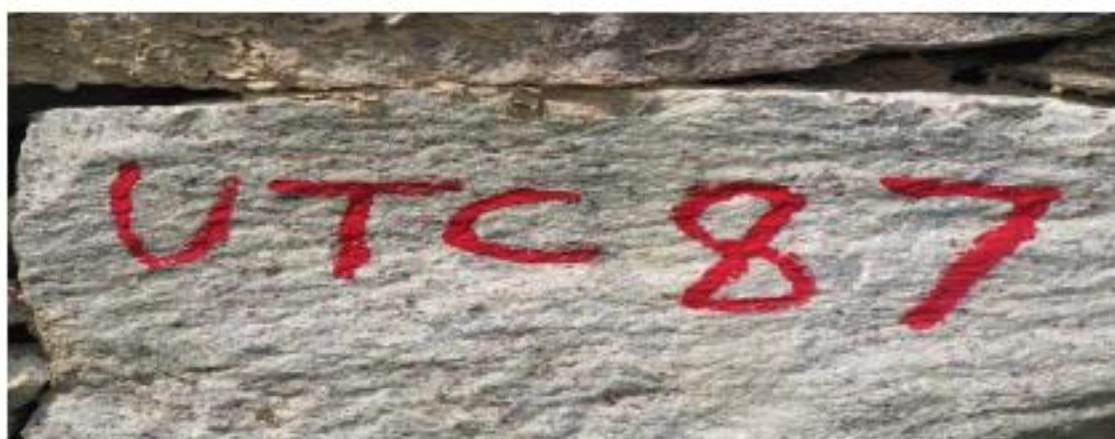


Profile 87

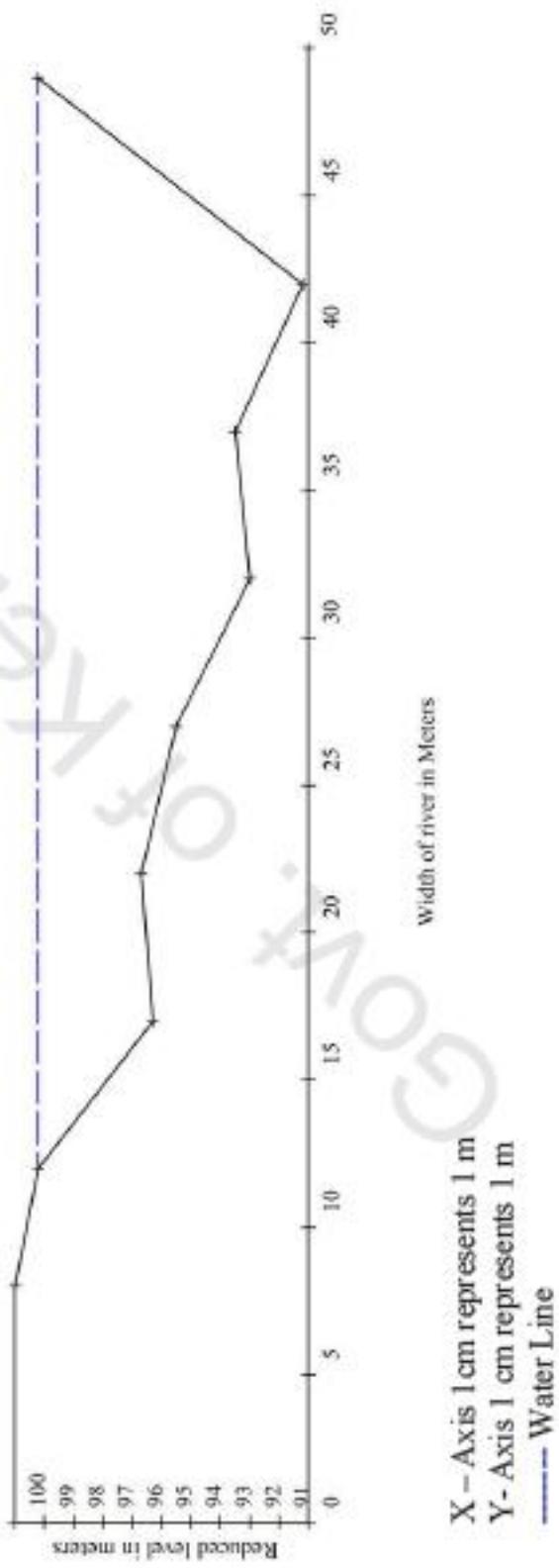
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.401			101.401	100	BM (LB)	0
	1.401			99.99	LBP	8 m
	2.201			99.2	LBWL	12
	3.90 (6.101)			95.3	WD	17
	3.50 (5.701)			95.7	WD	22
	4.70 (6.99)			94.5	WD	27
	7.20 (9.401)			92	WD	32
	6.70 (8.901)			92.5	WD	37
	9.00 (11.201)			90.2	WD	42
	2.201			99.2	RWL	47
		1.42		99.981	RBP	49

This cross-section falls at the Tholkkadavu of Kottakkakan ward of Kulathoor Panchayat. Protection wall on the left bank is taken as benchmark. It lies between $08^{\circ}19'58.3''$ N latitude and $077^{\circ}05'01.8''$ E longitude



PROFILE-87
KULATHOOR GRAMA PANCHAYAT
TBM: Protection wall at Tholikkadavu on the right bank



Profile 88

Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.51			101.51	100	RBP (BM)	0
	2.35			99.16	RBWL	2 m
	2.80 (5.15)			96.36	WD	17
	4.50 (6.85)			94.66	WD	12
	5.30 (7.65)			93.86	WD	17
	5.30 (7.65)			93.86	WD	22
	5.10 (7.45)			94.06	WD	27
	4.70 (7.05)			94.46	WD	32
	4.70 (7.05)			94.46	WD	37
	2.80 (5.15)			96.16	WD	42
		2.35		99.16	RBP	17

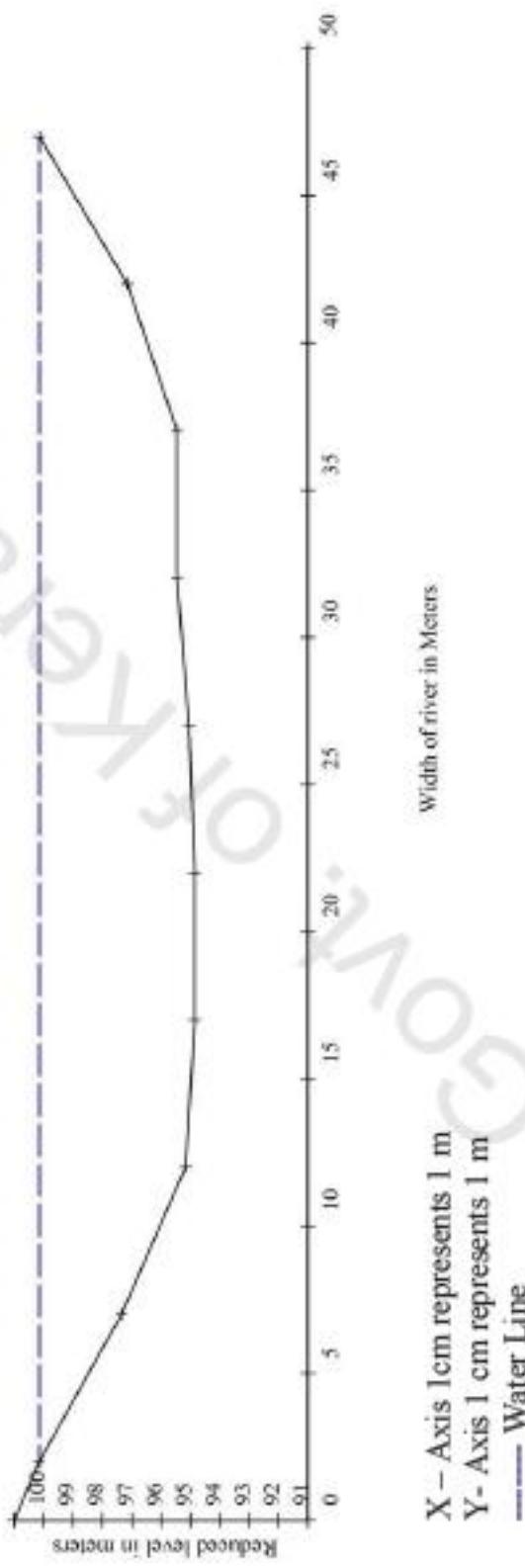
The present profile falls at Vattamkadavu of Kulathoor Panchayat. The Bench mark is on the protection wall on the right bank of the river. It lies between $08^{\circ}19'52.6^{''}$ N latitude to $077^{\circ}04'53.9^{''}$ E longitude



PROFILE - 88

KULATHOOR GRAMA PANCHAYAT

TBM Protection constructed at Vattiam Kadavu on the right bank



Profile 89

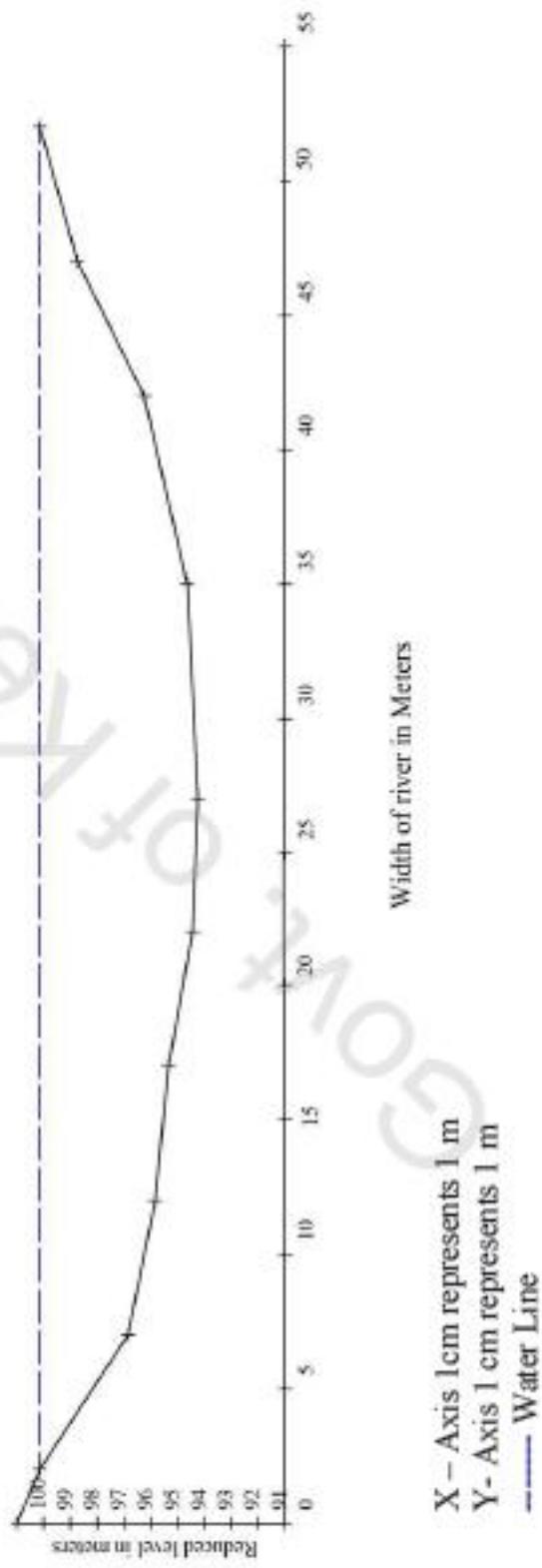
Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.75			101.75	100	LBP (BM)	0
	2.6			99.15	LBWL	2 m
	3.30 (5.9)			95.85	WD	7
	4.60 (7.2)			94.55	WD	12
	4.80 (7.4)			94.55	WD	17
	5.70 (8.3)			94.35	WD	22
	5.90 (8.5)			93.45	WD	27
	5.30 (8.1)			93.25	WD	22
	3.30 (5.9)			93.65	WD	37
	1.40 (4)			97.75	WD	42
	.80 (3.4)			98.35	WD	47
		2.6		99.15	RBWL	52

It falls at the Poovar Panchayat. A well on the right bank of the river is taken as benchmark. It lies between $08^{\circ}19'43.7''$ N latitude and $077^{\circ}04'50.7''$ E longitude



PROFILE-89
POOVAR GRAMA PANCHAYAT
TBM: Parapet of a well on the right bank



Profile 90

Field Book

BS	IS	FS	HI	RL	REMARKS	DISTANCE
1.65			101.605	100	RBP (BM)	0
	1.79			99.815	RBP	15
	1.68			99.925	RBP	30
	1.66			99.945	RBP	45
	2.26			99.345	RBWL	54
	5.10 (7.36)			94.245	WD	59
	6.60 (8.86)			92.745	WD	64
	6.80 (9.06)			92.545	WD	69
	7.10 (9.36)			92.245	WD	74
	6.30 (8.56)			93.045	WD	79
	4.50 (6.76)			94.845	WD	84
	2.10 (4.36)			7.245	WD	89
	2.26			99.945	LBWL	99
		1.69		99.915	LBP	100

This profile falls at the Arumanoor ward of Poovar Panchayat. A house (House No 72) in the right bank is taken as benchmark. It lies between $08^{\circ}19'32.6^{''}$ N latitude and $077^{\circ}04'47.6^{''}$ E longitude.



PROFILE -90
POOVAR GRAMA PANCHAYAT
TBM: Parapet of well on the right bank

