



The River Rejuvenation Committee **Government of Goa**

**Name of the work: Preparation of Action Plan for
Rejuvenation of Polluted Stretches of Rivers in Goa**



Action Plan Report on Valvanti River

March 2019

Contents

Executive Summary:	4
Action Plan Strategies:	9
1. Brief about Valvanti River:	14
1.1. River Valvanti:	14
1.2. Water Quality of River Valvanti:	15
1.3. Water Sampling Results:.....	16
1.4. Data Analysis and interpretation:	17
1.5. Action Plan Strategies:.....	18
1.6. Major Concerns:.....	18
2. Source Control:	19
3. River Catchment Management:	20
4. Flood Plain Zone:	21
5. Greenery Development- Plantation Plan:	22
6. Ecological / Environmental Flow (E-Flow):	23
7. Action Plan Strategies:	25
7.1. Conclusion & Remark:	27

Index of Tables

Table 1 Details of Lift Irrigation Schemes in Bicholim Taluka	7
Table 2 Sampling locations of Sanquelim River	15
Table 3 Valvanti River parameters near Sanquelim	16
Table 4 Details of Lift Irrigation Schemes in Bicholim Taluka	23

Table of Maps

Map 1 Map showing the Valvanti River Stretch in Goa State	11
Map 2 Valvanti –Polluted Stretch (5 km) From Sankli-Bicholim to Poriem	12
Map 3 Map showing stretch of Valvanti River	14
Map 4 Map showing the Sampling location on Valvanti River	15
Map 5 Map showing stretch of Valvanti River	20
Map 6 Map showing River Rejuvenation Concept by Recycling of the treated water	24

Table of Images

Image 1 Valvanti River	4
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Abbreviations

BOD	Bio-Chemical Oxygen Demand
CPCB	Central Pollution Control Board, New Delhi
DO	Dissolved Oxygen Content
DMA	Directorate of Municipal Administration, Panjim Goa
GSPCB	Goa State Pollution Control Board, Panjim Goa
FC	Faecal Coliform
MBGL	Meters below ground levels
MLD	Million liters per Day
NEERI	National Environmental Engineering Research Institute Nagpur
NGT	National Green Tribunal
PWD	Public Work Department of Goa State
SEAC	State Level Environment Expert Appraisal Committee
SEIAA	State level Environment Impact Assessment Authority.
SIDCGL	Sewerage Infrastructure Development Corporation of Goa Limited, Panjim Goa.
TC	Total Coliform
ULB	Urban Local Body
WRD	Water Resources Department of Goa

References

- Salinity report by GSPCB, Panjim Goa.
- Annual parameters monitoring by GSPCB (from 2015 till 2018).
- Integrated Coastal Zone Management of Coastal Zone in Goa – Council of Scientific & Industrial Research July 2013.

Executive Summary:

The Valvanti River is one of the major tributary of the Mandovi River. The Valvanti River is the interstate river originates in Karnataka on the Northern part of the Goa state. This river is known as Haltar River in Karnataka and flows further down and enters in Maharashtra State, known as Viridi. The river enters in the state of Goa on hilly terrain of Siroli / Gotheli in North Goa District and travels from Gotheli, Poriem, Sanquelim, Karapur and Bicholim before it discharges into Mandovi River near Sarmanas.

The Goa State Pollution Control Board (GSPCB) monitors the water quality of River Valvanti at one location near Sanquelim, between the polluted stretches of the Valvanti River, i.e. Sanquelim- Bicholim to Poriem, which is 5 Kms in length.

The said monitoring by GSPCB is carried out on a monthly basis throughout the year under the National Water quality Monitoring Programme (NWMP) as per directives of CPCB. This Stretch of the River Valvanti between Poriem to Sanquelim-Bicholim is classified as Class C (for Drinking water source after conventional treatment and disinfection). On the basis of GSPCB reports, Central Pollution Control Board (CPCB) has classified Valvanti River (Stretch from Sakhli-Bicholim to Poriem) under Priority V, is having BOD level range 3 mg/lit.

The Monitoring Reports for the period April 2015 to November, 2018 at one location for the parameters of DO, BOD and Total Coliform (TC) have been taken into consideration for the preparation of Action Plan. As per GSPCB monitoring reports, the observed DO and BOD levels in the polluted river stretch between Poriem to Sanquelim-Bicholim are well above the desired level of 5 mg/l or required for Class C water quality for drinking water source. The TC levels in the polluted river stretch between Poriem to Sanquelim-Bicholim are exceeding the desired limits of 5000 MPN/ 100ML for Class C water quality.



Image 1 Valvanti River

During the survey conducted for identification of pollution sources, it has been observed that the untreated domestic sewage outfalls mainly from the Sanquelim town contributing to the values of total coliform in the polluted stretch.

The proposed action plan for Valvanti River comprises of the following key issues and future necessary plan to be implemented:

A. Source Control: The source control includes the industrial pollution control and treatment and disposal of domestic sewage, as detailed below;

a) **Industrial Pollution Control:** The source identification studies were conducted during the month of January and February 2019. There are no industrial outfalls contributing the pollution in this stretch of Valvanti River.

b) **Channelization, treatment, utilisation and disposal of treated domestic sewage:**

- The physical survey carried out during January and February 2019, the domestic untreated sewage discharge is observed from the areas like Sanquelim, Karapur and other urbanised areas along the bank of the river.
- The underground sewerage scheme and Sewage Treatment Plant of 0.8 MLD for three wards of Sanquelim Municipal Council and surrounding areas was completed in December, 2013 by Goa State Infrastructure Development Corporation. However, the same has not been made operational till date. The Project is now handed over to the Sewerage Infrastructure Development Corporation Limited (SIDCGL) for upgrading and making the sewerage scheme operational. The estimated cost for the same is Rs. 2.5 Crores and it is expected to be completed in a period of twelve months.
- Discharges from individual house directly into the River and also into storm water drains/Nallahs leading to the River were observed on the Eastern as well as Western Bank during the physical survey. The Directorate of Panchayat and Directorate of health services will initiate the following action through village Panchayat and the health officers after carrying out detailed survey
 1. Disconnection of the direct discharge into the river/storm water drain / Nallah.
 2. The SIDCGL shall complete the house service connections and stop the discharge from the individual houses.
 3. Installation of Bio toilets along the river stretch.

4. Construction of septic tank and soak pits by residential houses and monitoring the frequent cleaning the septic tanks in order to avoid untreated domestic sewage discharge in to the natural drains.

B. River Catchment / Basin Management: Controlled ground water extraction and periodic quality assessment.

- i. **Periodic monitoring of ground water resources and regulation of ground water extraction by industries particularly in over exploited and critical zones:**

The central Ground Water Board has carried out survey of Aquifer System in the State of Goa in Sept. 2013. After studying the aquifer report, it is observed that the ground water table along the Valvanti river stretch is 2 m to 5 m below the ground level during Post monsoon season. The water table lowers down in summer by 0 to 2 M¹.

As the ground water table is high within the Valvanti river basin, there are no such actions proposed for improvement of the ground water table.

C. Flood Plain Zone:

- i. **Regulating activity in flood plain zone:**

During the physical survey, domestic untreated sewage disposal in the tributaries is observed near Sanquelim & Karapur. The SIDCGL/Directorate of Panchayat and Directorate of health services will initiate action through the village panchayat and Health Officer Concern to ensure that the domestic sewage is treated to septic tank and soak pit.

- ii. **Management of Municipal, Plastic Hazardous Bio-Medical & Electrical and Electronic Waste:**

The Local bodies are collecting segregated non-biodegradable waste which is sent to the Goa Waste Management Corporation (GWMC) and subsequently transported to the baling station at Saligao within the state for bailing and recycling. Sanquelim Municipal Council which has its own solid waste management facility including windrows composting, treats biodegradable as well as non-biodegradable waste as per SWM rules 2016. Considering the shortfall in the present system, an additional shed for storage of non-biodegradable waste during monsoon. The baled non-

¹ Aquifer System of Goa, Central Ground Water Board Sept. 2013

biodegradable waste is thereafter transported to cement plants in Karnataka for co incineration. The remaining Panchayats are predominantly having single dwelling units and there is no major issue disposal of biodegradable waste. GWMC will expand their SWM facility at Saligao from present 125 tons per day to 250 +20 % (300 tons day) capacity within a year.

However, improvement in the house to house collection of segregated waste and necessary installation of transfer station for non-biodegradable waste would be completed within period of 6 months. Necessary direction for the same will be issued by the Directorate of Panchayat.

iii. Greenery Development – Plantation Plan:

It was observed during the Physical survey that there are extensive coconut, orchards along both the bank of the River.

D. Ecological / Environmental Flow (E-Flow):

- i. **Issues relating to E- Flow:** There are in all 11 Bandhara's constructed on the Valvanti River at locations listed in the table below.

Table 1 Details of Lift Irrigation Schemes in Bicholim Taluka.

Sr. No.	Location of Bandhara / Weir	Use of water
VALVANTI RIVER		
1.	Goteli-I, Keri-sattari	Irrigation, water conservation
2.	Dhanagarwada-Keri	Irrigation ,water conservation
3.	Haldichekond-Keri	Irrigation ,water conservation
4.	Morlem	Irrigation ,water conservation
5.	Ranewada	Irrigation ,water conservation
6.	Poriem	Irrigation ,water conservation
7.	Chinchamol- Morlem	Irrigation ,water conservation
8.	Mathwada	Irrigation ,water conservation
9.	Zariwada-Padocem	Irrigation ,water conservation
10.	Sankhalim Bandhara	Drinking purpose, Padocem plant and Sankhalim plant
11.	Viridi bandhara, Viridi	Industrial Purpose & Irrigation Purpose

The Valvanti River originates in the State Karnataka and then flows from State of Maharashtra and enters the State of Goa. The Mhadei water dispute tribunal has passed an award on 14th August 2018 in which the State of Karnataka and Maharashtra have been directed to ensure sufficient flows in order to maintain the E-flow in the River Valvanti basin in Goa State. Further the water is released from Anjunem dam and 11 Bandharas during the lean season to maintain the E-flow throughout the year.

- ii. **Irrigation practices:** Water from Sanquelim has been used for Irrigation purpose in nearby areas through the lift irrigation schemes listed in the table above. The water from the Anjunem Dam is released for irrigation purpose from the month of December to May.

Action Plan Strategies:

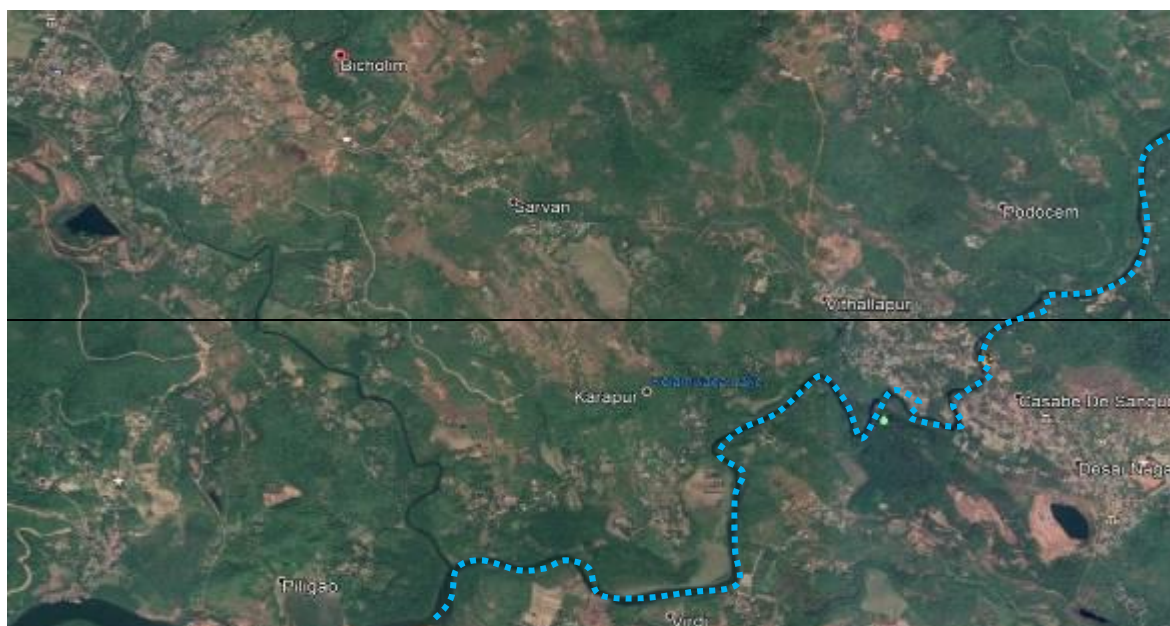
The action plan strategies based on the sampling analysis of the GSPCB, site survey and observations are listed below. These strategies are classified on the basis of the existing proposal in place, recommended upgradation in order to achieve the desired objective on short term and long term basis.

Sr. No.	Action Strategy	River Stretch	Agency	Time Frame
1.	<p>Disconnection of direct discharges of domestic sewage into the Valvanti. River/storm water drains/ nallah.</p> <ul style="list-style-type: none"> ➤ Disconnection of the direct discharge into the river/storm water drain/Nallah. ➤ Installation of Bio toilets ➤ Construction of septic tank and soak pits by residential houses. 	<p>Poriem to Sanquelim</p> <p>a) Poriem b) Honda c) Karapur & Sarvona</p>	<p>Directorate of Panchayat, Directorate of Health & Services;</p>	6 months
2.	<p>a) Improvement to collection system, and erection of material recovery facilities / storage shed for non-biodegradable waste in the village Panchayat areas along the banks of Valvanti River.</p> <p>b) Improvement and Up gradation of the existing Solid Waste Management Facility of Sanquelim Municipal Council; installation of biogas plant of 3 tons per day and construction of storage shed.</p>	<p>a) Poriem b) Honda c) Karapur & Sarvona</p>	<p>Respective Village Panchayat and Directorate of Panchayat</p>	12 months
3.	<p>Expansion of Saligao Waste Management facility from 125 tons per day to 250 + 20% (300 tons per day).</p> <p>Project cost i.e. 82 cr.</p>	<p>a) Pernem b) Bardez c) Bicholim & d) Sattari talukas in North Goa</p>		9 months

Sr. No.	Action Strategy	River Stretch	Agency	Time Frame
		District.		
4.	Commissioning of existing sewerage network and STP 0.8 MLD capacity. (Covering 3 wards)	a) Sanquelim b) 3 wards i.e. Bandharwad a, Muslim Wada Muzar wada & Gokulwadi	SIDCGL	12 months
5.	The State of Goa has identified site for construction of Common Biomedical waste at Kundaim Industrial Estate. The National Environmental Engineering Research Institute (NEERI, Nagpur) has conducted the EIA study. The study report has been submitted to the SEIAA /SEAC seeking Environmental Clearance for the facility. The facility expected to be commissioned and operation within next 18 months. In the meanwhile the Healthcare facilities have their own treatment facilities such as Autoclave, Deep burial pit and encapsulation pit, needle burners etc.	The Common Bio-medical waste treatment facility at Kundaim will treat all the Bio-medical waste generated in the State of Goa.	Goa Waste Management Corporation	18 months
6.	The Goa Waste Management Corporation and Producer Responsibility organization are collecting the E-waste generated throughout the State and the E waste is there after transported to authorized recyclers in other states.	The complete State of Goa	Goa Waste Management Corporation	Ongoing

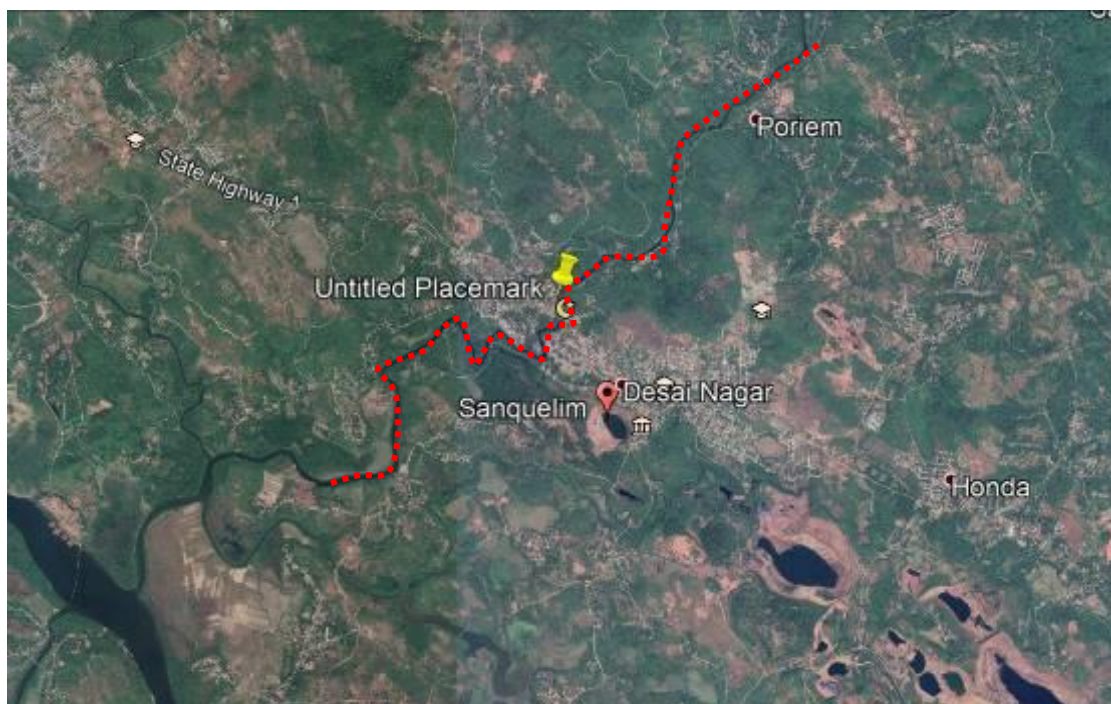
Introduction:

The Valvanti River is one of the major tributary of the Mandovi River. The Valvanti River is the interstate river originates in Karnataka on the Northern part of the Goa state. This river is known as Haltar River in Karnataka and flows further down and enters in Maharashtra State, known as Viridi. The river enters in the state of Goa on hilly terrain of Siroli / Gotheli in North Goa District and travels from Gotheli, Poriem, Sanquelim, Karapur and Bicholim before it discharges into Mandovi River near Sarmanas.



Map 1 Map showing the Valvanti River Stretch in Goa State.

The Goa State Pollution Control Board (GSPCB) monitors the water quality on a monthly basis throughout the year in Valvanti River under the Central Pollution Control Board Programme at Sanquelim. On the basis of GSPCB reports, Central Pollution Control Board (CPCB) has classified Valvanti River (from Sanquelim- Bicholim to Poriem) under priority V, having BOD level 4.3 mg/lit.



Map 2 Valvanti –Polluted Stretch (5 km) From Sankli-Bicholim to Poriem

During the Physical Survey it has been observed that there are Coconut plantations along the bank of the River. There are residential houses located on the bank of the River on eastern and western Bank. Direct discharge of untreated domestic sewage into the River and storm water drains / nallah leading to the river were observed during the Physical Survey.

a) Objectives:

The Hon'ble National Green Tribunal in the Original Application No 673 of 2018, vide its Order dated 20th September, 2018 directed the State Governments to prepare an Action Plan within two months for bringing all the polluted river stretches to be fit at least for bathing purposes (i. e. BOD < 3 mg/L and TC < 5000 MPN/100 ml for C- Class rivers as per Environment Protection act 1986) within 6 months from the date of finalisation of the action plans.

In the said order the Hon'ble National Green Tribunal has directed that the Action Plan should cover aspects pertaining to Source control, Industrial Pollution Control, Channelization treatment, utilisation and disposal of treated domestic sewage, river catchment/ basin management /control, ground water extraction and periodic quality assessment, flood plain zone , ecological / environmental flow (e-flow) and such other issues may be found relevant for restoring water quality to the prescribed standards. The Hon'ble National Green Tribunal in their order has further directed to take into account the Model

Action Plan for Hindon River, already prepared by CPCB while preparing the Action plans for other polluted river stretches.

Vide the said order the Hon'ble NGT directed that the four member committee comprising of Director Environment, Director Urban Development, Director Industries and Member Secretary, State Pollution Control Board shall be the Monitoring Committee for the execution of the Action Plan. The Committee shall be called "River rejuvenation Committee (RRC)" and will function under the overall supervision & co-ordination of the principal Secretary of the concern state. The action plan shall include components like identification of polluting sources including functioning / status of STP's, ETP's CETP, and solid wastes management processing facilities, quantification and characterisation of solid waste, trade & sewage generated in the catchment areas of polluted river stretch. The action plan should address issues related to, ground water extraction, adopting good irrigation practices, protection and management of flood plain zones, rain water harvesting, ground water charging, maintaining minimum environmental flow of rivers & plantation on both sides of the river.

The Hon. NGT has directed that setting of bio-diversity Park on flood plains by removing encroachments shall be considered as an important component of river rejuvenation. The action plan is expected to focus on proper interception and diversion of sewage carrying drains to the sewage treatment plant and emphasis should be on utilisation of treated sewage so as to minimise extraction of ground or surface water.

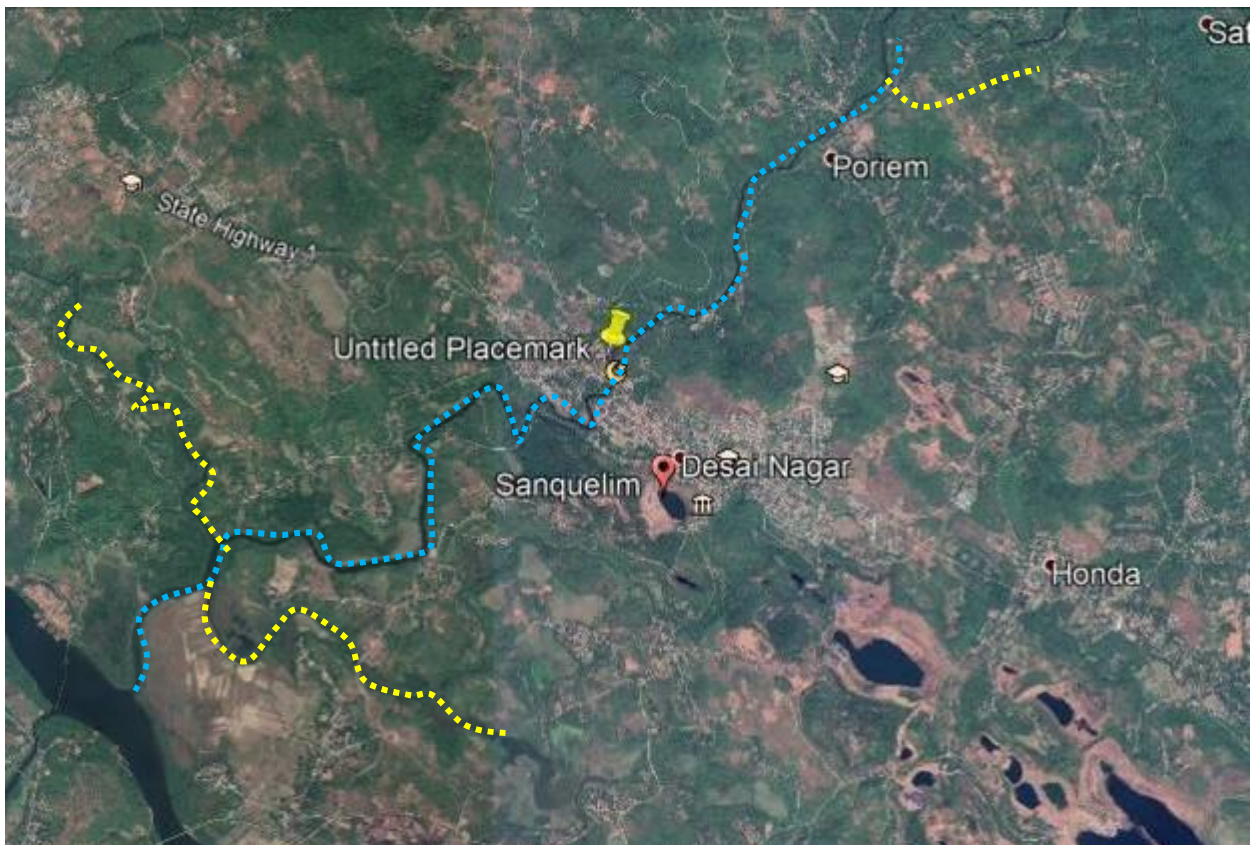
The Hon'ble NGT has directed to ensure that the action plan should have definite or specific timelines for execution steps. The State Government is required to set up a special environment surveillance task force in terms of this order. The said task force has to ensure that no illegal mining takes place in river bed of such polluted stretches. The river rejuvenation committee is directed to have website inviting public participation from educational, religious institutions and commercial establishment. The achievement and failure may also be published on such website. The Committee may consider suitably rewarding those contributing significantly to the success of the project.

The RRC's will have the authority to recover the cost rejuvenation in Polluter pays Principal from those whose may be responsible for the pollution, to the extent found necessary. In this case principal laid down by this tribunal in the said order. Voluntary donations, CSR contribution voluntary services and private participation may be considered in consultation with the RRC.

1. Brief about Valvanti River:

1.1. River Valvanti:

The Valvanti River is one of the major tributary of the Mandovi River. The Valvanti River is the interstate river originates in Karnataka on the Northern part of the Goa state. This river is known as Haltar River in Karnataka and flows further down and enters in Maharashtra State, known as Viridi. The river enters in the state of Goa on hilly terrain of Siroli / Gotheli in North Goa District and travels from Gotheli, Poriem, Sanquelim, Karapur and Bicholim before it discharges into Mandovi River near Sarmanas.



Map 3 Map showing stretch of Valvanti River

Nomenclature

Identification



Valvanti river stretch



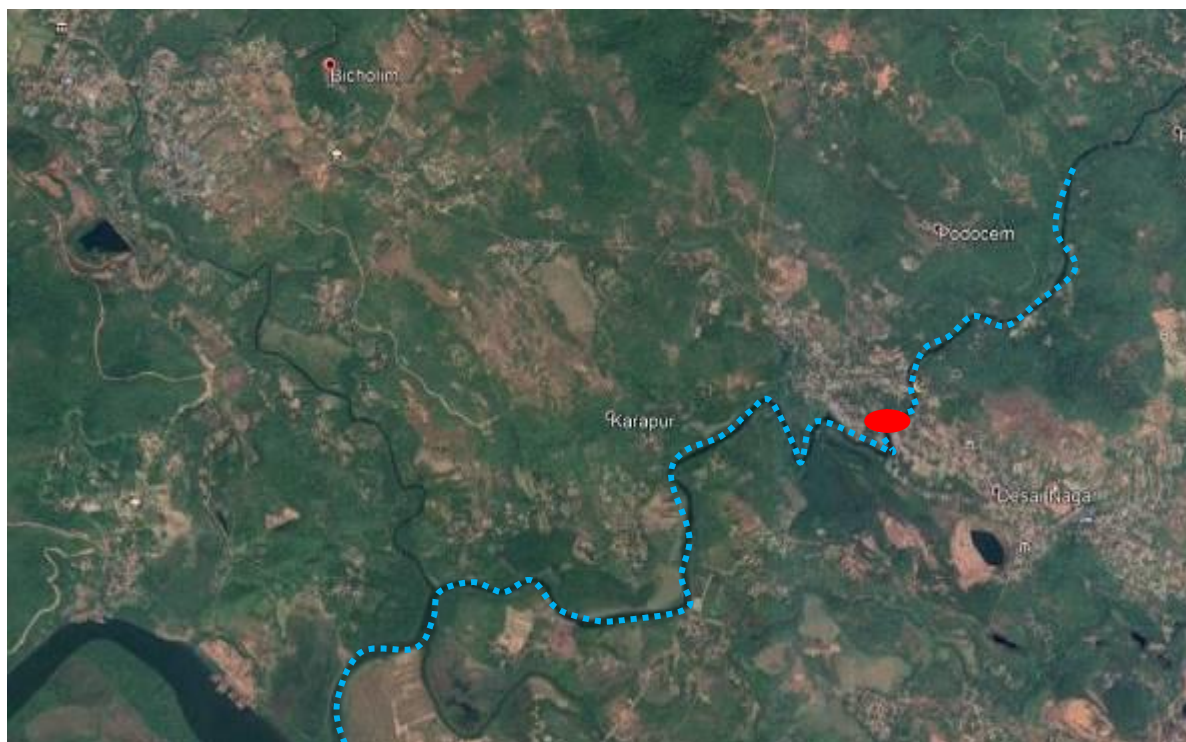
Tributaries of the Valvanti river

The water sampling was carried out by GSPCB under NWMP, the CPCB has declared the stretch between Poriem to Sanquelim (Bicholim) having approximate length of 5.00 Kms.

Table 2 Sampling locations of Sanquelim River

Location	Co-ordinates	
	Latitude	Longitude
Sanquelim	15°34'4.71" N	74°0'26.82 E

The map showing the locations of the sampling is referred in map below.

**Map 4 Map showing the Sampling location on Valvanti River**

Nomenclature

Identification



Valvanti river stretch



NWMP Sampling point location on Valvanti river

1.2. Water Quality of River Valvanti:

For the purpose of conceptualising the plan of action for the polluted river stretch of Valvanti River the data of water quality monitoring carried out by GSPCB for three seasons was considered from year 2015 to 2018 as under

- Pre monsoon (January - May)
- Monsoon (June – September)

c) Post Monsoon (October - December)

1.3. Water Sampling Results:

The sampling results of the GSPCB for the period 2015 to 2018 was analysed to decide the Action plan strategies.

Table 3 Valvanti River parameters near Sanquelim²

Sr. No.	Year Parameters	2015	2016	2017	2018	Range
Pre - Monsoon (January to May)						
1.	DO (mg/l)	6.5 - 7.6	6.6-6.9	6.7 - 7.6	6.5 - 7.1	6.5 - 7.6
2.	BOD (mg/l)	1.3 - 2.1	0.9 - 1.4	3.4 - 4.3	1.7 - 2.1	0.9 - 4.3
3.	Total Coliform (MPN/100ml)	14000-14000	2300-13000	4600-54000	1300-7900	1400-54000
Monsoon (June to September)						
1.	DO (mg/l)	7.0 – 8.0	7.5 - 7.8	7.7	7.3 - 7.5	7.0-8.0
2.	BOD (mg/l)	1.0 - 2.6	0.3 - 1.2	0.2 - 0.5	0.5 - 1.2	0.2-2.6
3.	Total Coliform (MPN/100ml)	4900 - 14000	4600-11000	7900-54000	7000-17000	4600-54000
Post - Monsoon (October to December)						
1.	DO (mg/l)	6.3-6.5	7.1 - 7.5	7.6 - 7.8	7.2 - 8.4	7.2
2.	BOD (mg/l)	1.0 - 1.1	2.5 - 3.9	2.1 - 3.4	1.3 – 2.0	2.4
3.	Total Coliform (MPN/100ml)	4900-7900	4900-13000	7900-13000	4900-4900	4900-13000

The DO in Valvanti River at Sanquelim during pre-monsoon season varies from 6.6 mg/l to 7.6 mg/l and 7.3 mg/l to 7.8 mg/l during monsoon and 6.3 mg/l to 7.8 mg/l in post monsoon period.

The BOD in Valvanti River at Sanquelim during pre-monsoon season varies from 0.9 mg/l to 4.3 mg/l and 0.2 mg/l to 2.6 mg/l during monsoon and 1.0 mg/l to 3.4 mg/l in post monsoon period

² GSPCB Sampling under NWMP

The TC in Valvanti River at Sanquelim during pre-monsoon season varies from 1400 MPN/ 100ml to 54000 MPN/ 100ml and 4600 MPN/ 100ml to 54000 MPN/ 100ml during monsoon and 4900 MPN/ 100ml to 13000 MPN/ 100ml in post monsoon period.

Summary of the Sampling analysis

Dissolved Oxygen (DO)

All the observed Dissolved Oxygen values of Valvanti River water are normal and indicate well oxygenated water during all the three season i.e. Pre-monsoon, Monsoon and Post – monsoon and good for aquatic life.

Biochemical Oxygen Demand (BOD)

All the observed values of BOD are less than 3 mg/l and indicate low organic matter addition to the Valvanti River.

Total Coliform

The observed values of Total coliform indicate pollution sources in the River Valvanti.

1.4. Data Analysis and interpretation:

The results of the water sampling carried out by Goa state Pollution Control Board at Sanquelim on Valvanti River from April 2015 to December 2018, in respect of DO, BOD and Total coliform have been considered for preparation of action plan.

- **Dissolved Oxygen (DO)**

The observed DO levels in the polluted river stretch between Poriem to Sanquelim as can be seen from the GSPCB monitoring reports are well above the desired level of 4 mg/l required for bathing water quality.

- **Biochemical Oxygen Demand (BOD)**

The observed BOD levels in the polluted river stretch between Poriem to Sanquelim as can be seen from the GSPCB monitoring reports are well below the desired level of 3 mg/l required for bathing water quality.

- **Coliforms**

The observed TC levels in the polluted river stretch between Poriem to Sanquelim as can be seen from the GSPCB monitoring reports are above the desired levels of 5000 MPN/ 100ML for bathing water quality.

1.5. Action Plan Strategies:

This Valvanti river stretch is polluted stretch under **Priority V as identified by the CPCB**. The action plan is limited to the Regulatory interventions proposed in order to restore the Water Quality to the desired bathing water quality standards notified by the CPCB. The Action Plan has been prepared to achieve Total coliform < 5000 MPN/ 100 ml in the River Valvanti in the identified polluted stretch.as other parameters of DO and BOD are within the desired limits.

1.6. Major Concerns:

The polluted river stretches of Valvanti River **falls under priority V**. The parameters like Dissolved Oxygen and Bio-chemical Oxygen Demand is meeting prescribed statutory requirement but the levels of Total Coliforms (TC) exceeds the prescribed limits.

2. Source Control:

The reconnaissance survey was conducted along with the GSPCB officials for the polluted stretch of Valvanti River between Sanquelim to Poriem during the month of January and February, 2019. The objective of this study is to analyse the sources of pollutants along the identified polluted river stretch.

a) Industrial Pollution Control

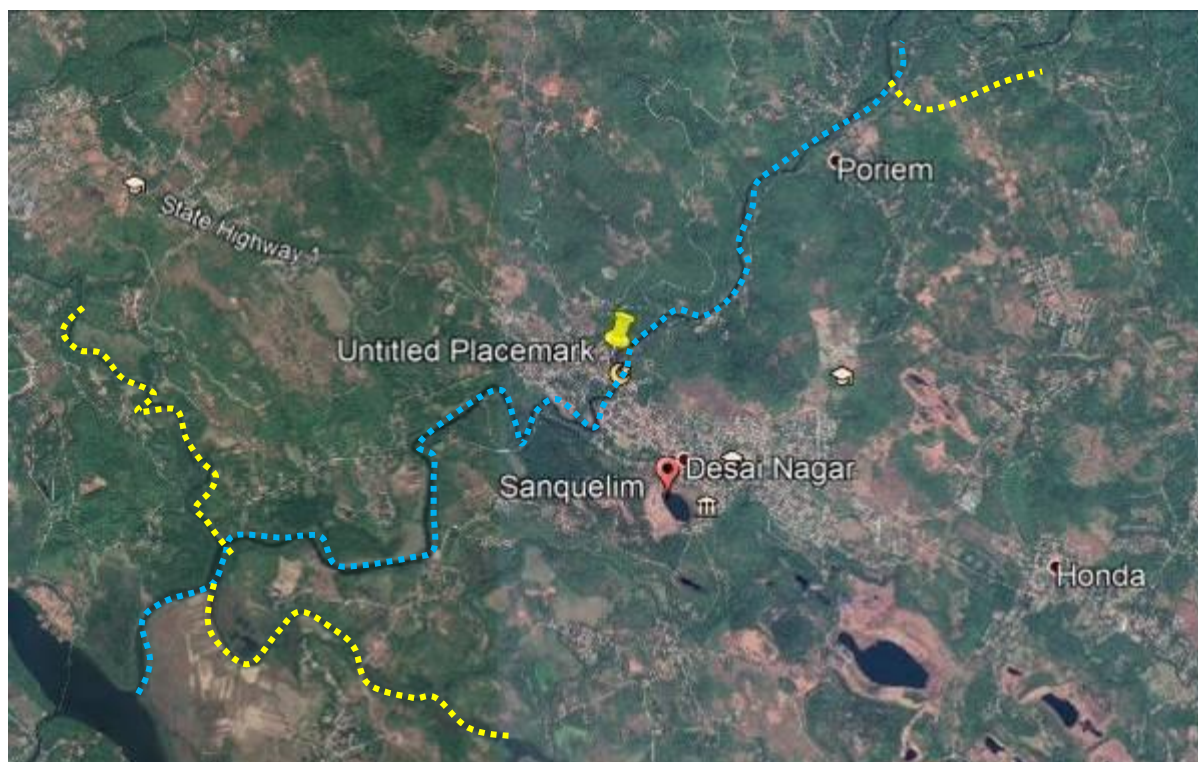
During the physical survey carried out during the month of January, February 2019 it has been observed there is no discharge from industrial units into the River Valvanti.

b) Channelization, treatment, utilisation and disposal of treated domestic sewage:

The reconnaissance survey was carried out during the month of January, February 2019, for identification of the sources of pollution of River Valvanti.

i. Sources of Pollutants:

The polluted river stretch (Poriem to Sanquelim) was physically surveyed along both the banks of river during month of January and February 2019, for identification of sources of pollution. During the physical survey the discharge of untreated domestic sewage through nallah/ storm water drains was observed mainly on the Western Bank of the River at Sanquelim & on eastern bank from Karapur. The main challenge in this River Stretch is to control the levels of Total Coliforms.



Map 5 Map showing stretch of Valvanti River**Nomenclature****Identification**

Valvanti river stretch

Tributaries of the Valvanti river

3. River Catchment Management:

The Anjunem Lake is on the upstream side of the Valvanti River, the Command area of the lake is 2100 Ha and been used for irrigation purpose. There are predominantly agricultural fields and orchards along both the banks of the River Valvanti.

i. Periodic monitoring of ground water resources and regulation of ground water extraction by industries particularly in over exploited and critical zones:

The central Ground Water Board has carried out survey of Aquifer System in the State of Goa in Sept. 2013. After studying the aquifer report, it is observed that the ground water table along the Valvanti river stretch is 2 m to 5 m below the ground level during Post monsoon season. The water table lowers down in summer by 0 to 2 M³.

As the ground water table is high within the Valvanti river basin, there are no such actions proposed for improvement of the ground water table.

³ Aquifer System of Goa, Central Ground Water Board Sept. 2013

4. Flood Plain Zone:

i. Regulating activity in flood plain zone:

During the physical survey, domestic untreated sewage disposal in the tributaries is observed near Sanquelim & Karapur. The SIDCGL/Directorate of Panchayat and Directorate of health services will initiate action through the village panchayat and Health Officer Concern to ensure that the domestic sewage is diverted to septic tank and soak pit.

The completed sewerage scheme of Sanquelim and surrounding suburb shall be commissioned in twelve months which will treat sewage from three wards of Sanquelim Municipal Council with a capacity of 0.8 MLD.

ii. Management of Municipal, Plastic, Hazardous, Bio-Medical & Electrical and Electronic Waste:

The Local bodies are collecting segregated non-biodegradable waste which is sent to the Goa Waste Management Corporation (GWMC) and subsequently transported to the baling station at Saligao within the state for bailing and recycling. Sanquelim Municipal Council which has its own solid waste management facility including windrows composting, treats biodegradable as well as non-biodegradable waste as per SWM rules 2016. Considering the shortfall in the present system, an additional shed for storage of non-biodegradable waste during monsoon. The baled non-biodegradable waste is thereafter transported to cement plants in Karnataka for co incineration. The remaining Panchayats are predominantly having single dwelling units and there is no major issue disposal of biodegradable waste. GWMC will expand their SWM facility at Saligao from present 125 tons per day to 250 +20 % (300 tons day) capacity within a year.

However improvement in the house to house collection of segregated waste and necessary installation of transfer station for non-biodegradable waste would be completed within period of 6 months. Necessary direction for the same will be issued by the Directorate of Panchayat.

The State of Goa has identified site for construction of Common Biomedical waste at Kundaim Industrial Estate. The National Environmental Engineering Research Institute (NEERI, Nagpur) has conducted the EIA study. The study report has been submitted to the SEIAA /SEAC seeking Environmental Clearance for the facility. The facility expected

to be commissioned and operation within next 18 months. In the meanwhile the Healthcare facilities have their own treatment facilities such as Autoclave, Deep burial pit and encapsulation pit, needle burners etc.

There is no dumped biomedical waste observed in the stretch of the Valvanti. River however for futuristic provision the state Govt. is taking appropriate action in order to avoid further pollution due to biomedical waste management.

The Goa Waste Management Corporation and Producer Responsibility organisation are collecting the E-waste generated throughout the State and the E waste is there after transferred to respective SPCB authorised recyclers in other states.

5. Greenery Development- Plantation Plan:

It was observed during the Physical survey that there are extensive coconut, orchards along both the bank of the River.

6. Ecological / Environmental Flow (E-Flow):

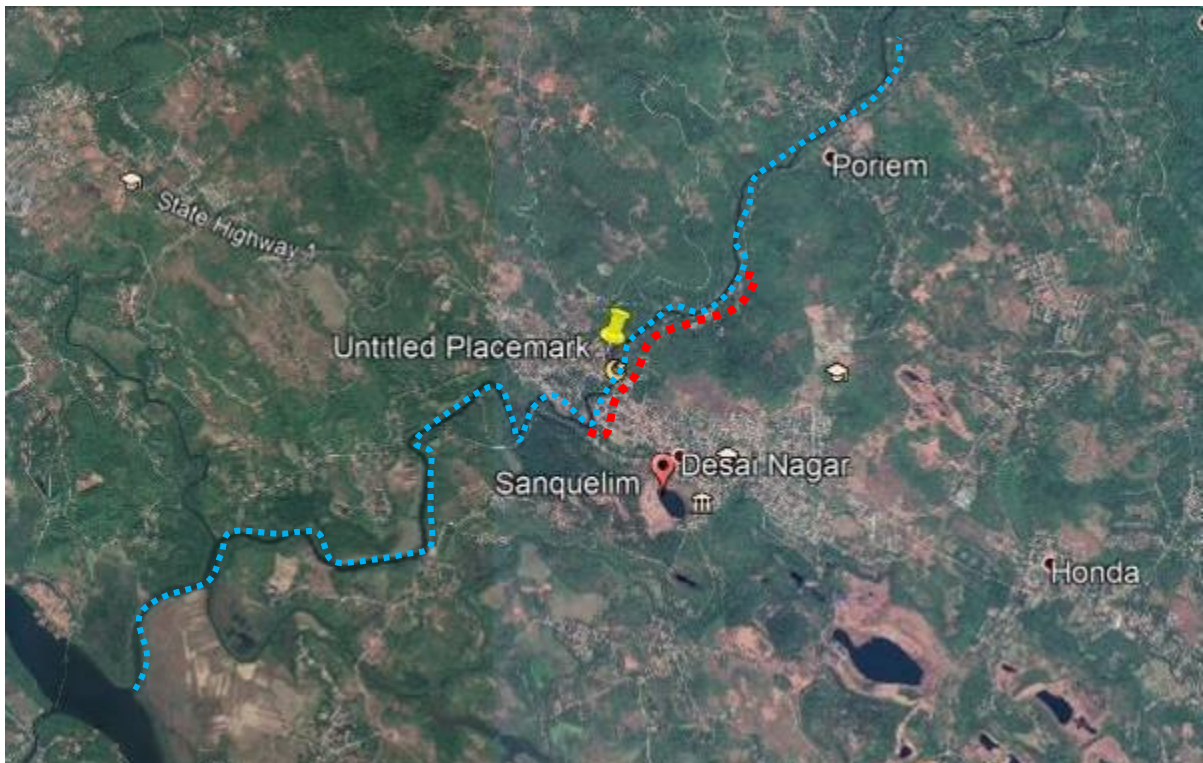
Issues relating to E- Flow: There are in all 11 bandhara constructed on the Valvanti River at locations listed in the table below.

Table 4 Details of Lift Irrigation Schemes in Bicholim Taluka.

Sr. No.	Location of Bandhara / Weir	Use of water
VALVANTI RIVER		
1.	Goteli-I, Keri-sattari	Irrigation, water conservation
2.	Dhanagarwada-Keri	Irrigation ,water conservation
3.	Haldichekond-Keri	Irrigation ,water conservation
4.	Morlem	Irrigation ,water conservation
5.	Ranewada	Irrigation ,water conservation
6.	Poriem	Irrigation ,water conservation
7.	Chinchamol- Morlem	Irrigation ,water conservation
8.	Mathwada	Irrigation ,water conservation
9.	Zariwada-Padocem	Irrigation ,water conservation
10.	Sankhalim bandhara	Drinking purpose, Padocem plant and Sankhalim plant.
11.	Virdi bandhara,Virdi	Industrial Purpose & Irrigation Purpose

The Valvanti River originates in the State Karnataka and then flows from State of Maharashtra and enters the State of Goa. The Mhadei water dispute tribunal has passed an award on 14th August 2018 in which the State of Karnataka and Maharashtra have been directed to ensure sufficient flows in order to maintain the E-flow in the River Valvanti basin in Goa State. Further the water is released from Anjunem dam and 11 Bandhara's during the lean season to maintain the E-flow throughout the year.

Irrigation practices: Water from Sanquelim has been used for Irrigation purpose in nearby areas through the lift irrigation schemes listed in the table above. The water from the Anjunem Dam is released for irrigation purpose from the month of December to May.



Map 6 Map showing River Rejuvenation Concept by Recycling of the treated water

7. Action Plan Strategies:

The action plan strategies based on the sampling analysis of the GSPCB, site survey and observations are listed below. These strategies are classified on the basis of the existing proposal in place, recommended upgradation in order to achieve the desired objective on short term and long term basis.

Sr. No.	Action Strategy	River Stretch	Agency	Time Frame
1.	<p>Disconnection of direct discharges of domestic sewage into the Valvanti. River/storm water drains/ nallah.</p> <ul style="list-style-type: none"> ➤ Disconnection of the direct discharge into the river/storm water drain/Nallah. ➤ Installation of Bio toilets ➤ Construction of septic tank and soak pits by residential houses. 	<p>Poriem to Sanquelim</p> <p>a) Poriem b) Honda c) Karapur & Sarvona</p>	<p>Directorate of Panchayat ,Directorate of Health Services;</p>	6 months
2.	<p>a) Improvement to collection system, and erection of material recovery facilities / storage shed for non-biodegradable waste in the village Panchayat areas along the banks of Valvanti River.</p> <p>b) Improvement and Up gradation of the existing Solid Waste Management Facility of Sanquelim Municipal Council; installation of biogas plant of 3 tons per day and construction of storage shed.</p>	<p>a) Poriem b) Honda c) Karapur & Sarvona</p>	<p>Respective Village Panchayat and Directorate of Panchayat</p>	12 months
3.	<p>Expansion of Saligao Waste Management facility from 125 tons per day to 250 + 20% (300 tons per day).</p>	<p>a) Pernem b) Bardez c) Bicholim & d) Sattari</p>		9 months

Sr. No.	Action Strategy	River Stretch	Agency	Time Frame
	Project cost i.e. 82 cr.	talukas in North Goa District.		
4.	Commissioning of existing sewerage network and STP 0.8 MLD capacity. (Covering 3 wards)	a) Sanquelim b) 3 wards i.e. Bandharwad a, Muslim Wada Muzar wada & Gokulwadi.	SIDCGL	12 months
5.	The State of Goa has identified site for construction of Common Biomedical waste at Kundaim Industrial Estate. The National Environmental Engineering Research Institute (NEERI, Nagpur) has conducted the EIA study. The study report has been submitted to the SEIAA /SEAC seeking Environmental Clearance for the facility. The facility expected to be commissioned and operation within next 18 months. In the meanwhile the Healthcare facilities have their own treatment facilities such as Autoclave, Deep burial pit and encapsulation pit, needle burners etc.	The Common Bio-medical waste treatment facility at Kundaim will treat all the Bio-medical waste generated in the State of Goa.	Goa Waste Management Corporation	18 months
6.	The Goa Waste Management Corporation and Producer Responsibility organization are collecting the E-waste generated throughout the State and the E waste is there after transported to authorized recyclers in other states.	The complete State of Goa	Goa Waste Management Corporation	Ongoing

7.1. Conclusion & Remark:

- i) The stretch of River Valvanti from Poriem and Sanquelim having length of 5 Kms is categorized as Priority V. The parameters such as DO and BOD are well within the CPCB prescribed standards. The only cause of concern is high levels of Total Coliform which is mostly due to the discharge of untreated domestic sewage through nallah, storm water drains including direct discharge from residential houses into the River. The pollution due to untreated sewage discharge will get reduced on commissioning of the sewerage scheme at Sanquelim which will cater to three wards in Sanquelim Municipal Council. The SIDCGL will take appropriate action and commission the sewerage scheme including the sewage treatment plant at Sanquelim Municipal Council within a year.
- ii) The action plan strategies have been elaborated above and will be implemented by concerned stakeholder departments/ corporations by taking necessary action for disconnection of direct discharges of domestic sewage and improvement in the collection and storage of the Solid Waste in the concerned Panchayat. The GWMC will expand their SWM facility at Saligao from 125 tons per day to 250 + 20 % (300 tons/ day) within a year.
- iii) The Valvanti River originates in the State Karnataka and then flows from State of Maharashtra and enters the State of Goa. The Mhadei water dispute tribunal has passed an award on 14th August 2018 in which the State of Karnataka and Maharashtra have been directed to ensure sufficient flows in order to maintain the E-flow in the River Valvanti basin in Goa State. Further the water is released from Anjunem dam and 11 Bandhara's during the lean season to maintain the E-flow throughout the year.
- iv) The implementation and execution of the proposed action plan will be monitored by the River Rejuvenation Committee constituted by the order of the Hon'ble National Green Tribunal.