

Joint Committee report on the orders of the Hon'ble National Green Tribunal, Southern Zone vide OA No.114 of 2020 (SZ) to OA No.122 of 2020 (SZ) Dt:25-7-2022

1. It is submitted that the Hon'ble National Green Tribunal, Southern Zone, Chennai vide order Dt:25-7-2022 in OA No.114 of 2020 (SZ) to OA No.122 of 2020 (SZ) Dt:25-7-2022 have directed to submit the report on the genuineness of the documents produced by the applicant i.e., Committee report given under Right to Information Act, 2005, wherein it was mentioned that the loss of income has been assessed including that of the some of the applicants in this case.
2. In this regard, the orders of the Hon'ble National Green Tribunal and actions taken by the various departments on the issue it is summarized and submitted below:
 - A. The Hon'ble National Green Tribunal, South Zone, Chennai heard the case on 22.07.2020 merged all applications i.e. O.A.No.114 to 122 of 2020 and constituted a committee consisting of officials viz. Collector , Fisheries Department:, A.P. Pollution Control Board, Coastal Aqua culture Authority, Acharya N.G. Ranga Agricultural University to inspect the area and submit a report.
 - B. Further, it was directed that the committee to go into the question as to whether any environmental damage has been caused on account of the unauthorized functioning of these shrimp/prawn cultivation in the agriculture land, whether any illegal discharge of untreated effluents being done into the water bodies from these units and if so for the quality of the water is affected, whether there is any authorized extraction of ground water for this purpose without obtaining any necessary permission from the authorities, considering the nature of the area as to whether it is critically over exploited or semi critical area and assess the environmental compensation and the persons responsible for the same apart from assessing individual damage caused to the agriculturist who have come with the application before this Tribunal.

3. In obedience to the above orders dt: 22.07.2020 of the Hon'ble National Green Tribunal, Chennai, the Collector & District Magistrate, SPSR Nellore District has appointed a committee vide proceedings Dt. 03-08-2020 under supervision of Sub Collector & Sub Divisional Magistrate, Gudur.
4. Based on the available information, the committee has submitted a report to the Hon'ble National Green Tribunal on 3-11-2020 based on the available data at that time and also made certain recommendations.
5. The paper book submitted by the applicant (which was obtained under RTI Act) is part of the committee report, which was submitted to the Hon'ble NGT on 3rd November, 2020 along with joint committee report. In the said report has been prepared by the Committee in which the average production of the paddy had been assessed by considering the statistics from the year 2005- 2013. In the report also it was mentioned that the yield as average. It is a known fact that the yield of paddy will not be uniform and it will vary depending upon the climatic conditions, variety of the crop, pests, availability of water etc.. Further it was noticed in the report that water level in the Mallam tank is very low and almost dried up. The water level in the irrigation channels also very low. It is pertinent to mention that the analysis of the meagre water in the mallam tank does not indicate the actual scenario as it will be in concentrated form.
6. The Hon'ble National Green Tribunal vide order dated :26-2-2021 has opined that the report submitted by the committee is **vague** in nature and issued further directions to the committee as follows:
 1. *The number of shrimp culture ie., being carried out the area and whether they are authorized / un authorized, what is the nature of steps taken by them (Authorities) to remove the illegal shrimp farms*
 2. *The report of the water analysis shown that there was contamination, but it was not mentioned the nature of action taken on it. It is also not clear as to how many units have been closed, how many of them are having necessary permission under law and whether there is any violation of CRZ etc.,*

3. *Not suggested any remedial measures to be taken for the purpose of residing the damage caused to the environment and also they have not assessed the environmental compensation as directed.*
4. *The Andhra Pradesh State Pollution Control Board (APPCB) did not filed any independent statement as to the nature of action taken by them in respect of the same ?*
5. *The committee as well as official respondents are directed to file a detailed report showing the name of the persons who are conducting such shrimp culture how many of them are unauthorized, what is the nature of action taken against each unit and also to assess the environmental compensation and suggest the remedial measures for restoring the damage caused to the environment and report to this Tribunal.*
6. *To assess the individual damage if any caused to the applicants on account of the alleged illegal activities of the party respondents and if so to assess the compensation individually depending upon the level of damage sustained by a particular applicant instead of giving a common finding that there was general damage caused and assessing compensation. They are also directed to show the distance between each unit from the properties of the applicant, so that the proximity of the unit which is likely to cause contamination can be made a yardstick for payment of compensation to the applicant. If there is any damage caused to the property on account of the alleged illegal activities of any of the respondents this must be specifically mentioned in the report to be submitted by the committee and they must also suggest the remedial measures to rectify the same.*
7. *The APPCB as well as other official respondents are directed to file the independent statement showing the nature of action taken by them against such units which they are expected to exercise under the provisions of law dealing with the same.*
7. Hence the committee had inspected again along with respective departments and submitted further report to the Hon'ble NGT as per the directions issued vide order dt: 26.02.2021. The Hon'ble National Green Tribunal, Chennai

considered the report of the joint committee and vide order dt:10-6-2021 issued the following directions:

- a. The regulators are directed to take immediate steps by following the rules in vogue for closure of the unauthorized units and also disconnection of power supply and they should not be allowed to continue their operation. If it is not done by the authorities, then the persons responsible will be taken to task by this Tribunal for not implementing the directions of this Tribunal in its letter and spirit. But before taking coercive steps, they are directed to follow the procedure to be followed in accordance with law.
- b. The Aqua Culture Authority, Fisheries Department and also the District Collector were made members of the committee. If they are coming within the regime of those authorities and when it is brought to their notice about such large scale violation, they are expected to take strict action against those violators in accordance with law and to come with a proper report as what is the nature of action taken by them to remove the unauthorized shrimp culture farms which are causing pollution to the soil as well as water.
- c. Further the committee has expressed their inability to assess the environmental compensation as according to them further study will have to be done by the agricultural department. If such a study has to be conducted, there is no bar for the District Collector to include such a person also in the committee to assess the environmental compensation and also compensation payable to the neighbouring agricultural persons who have come with an application claiming compensation as well.
- d. The Andhra Pradesh Pollution Control Board (APPCB) being the regulator is expected to give the methodology by which the contamination caused to the ground water and the soil can be restored and assess the amount required for restoration and also made the persons responsible for the same while applying " Polluter's Pay Principal" depending upon the contribution made by the individual unauthorized owners of the shrimp culture farms and also depending upon the nearness to the property to which the damage has been caused by their activities.

8. In obedience to the above orders of the Hon'ble National Green Tribunal, Chennai the joint committee had several meetings with all the line departments. The line departments had taken various steps to curtail the illegal shrimp culture in Mallam tank area and submitted a comprehensive report on the directions mentioned in the order dt: 10.06.2021. The line departments had submitted their further reports on the unauthorized shrimp cultures in Pittvanipalli, Ranganadapuram and Padartivarikandriga Villages of Chittamur Mandal.
9. It is pertinent to submit that the Andhra Pradesh Pollution Control Board has requested the Jawaharlal Nehru Technological University (JNTU), Kakinada for the following tasks:
 1. To suggest the remedial measures to be taken for the purpose of restoring the damage caused to the environment.
 2. To assess the amount required for restoration.
 3. To evolve the methodology to assess the environmental compensation on the un-authorized shrimp farmers.
 4. To evolve the methodology to assess the compensation to the farmers for whose lands were affected.

Accordingly, the team from the JNTUK visited the area, studied the available data and submitted the preliminary report with the following recommendations:

1. The remedial measures to be taken for the purpose of restoring the damage caused to the environment.

The results of the water samples indicate that almost all parameters are within the discharge standards stipulated by the MoEF&CC, Govt. of India. However, the aquaculture activity requires high saline water which is not suitable for paddy fields. Wastewater from the aqua ponds contains salts and does not contain harmful chemicals such as heavy metals and phenols. It is required to stop the fresh discharge of saline water effluents into the freshwater bodies when higher saline values are found in Mallam tank inlet. Accumulated salts if any in the water bodies will get diluted during the rains/ floods. Puli kalua is the

6

main feeding channel for Mallam tank. The flow in this channel will be high during rains/ floods. In the remaining period, flow will be very less and some of the aqua ponds discharge their effluents (Wastewater) into the Puli kaluva. It is required to provide a regulator at a suitable location to divert water during non-rainy days to Palamaduguvagu so as to facilitate the discharge of saline water into Sea.

2. Assessment of amount required for restoration.

Once saline water entry into the Mallam tank was stopped, the TDS in the Mallam tank becomes normal. Hence, there is no need for preparation of restoration plan separately.

3. Evolution of methodology to assess the environmental compensation on the un-authorized shrimp farmers.

The Fisheries department demolished 110.08 Ha of aqua ponds (175 nos) on 29.07.2021 and 30.07.2021 in presence of the revenue & other department officials. Aqua ponds in 41.63 Ha (66 nos) were not demolished due to court orders. There is meager activity going on in these unauthorized aqua ponds ever since their bunds were demolished i.e. since 30-07-2021. However, the APPCB may submit to the Hon'ble NGT not to impose Environmental Compensation on the aqua ponds as it is an activity very much similar to agriculture and most of the paddy farmers are showing interest to switch over to aquaculture to sustain their livelihood.

4. Evolution of the methodology to assess the compensation to the farmers for whose lands were affected.

The Agriculture department collected 31 soil samples from paddy fields and analyzed the PH, Electrical conductivity, Nitrogen, Phosphorous, Potassium , Sulphur, Boron, Zinc, Ferrous, Manganese and Copper. From the analysis two samples were critical for germination which are having Electrical conductivity- 3.7 dSm-1 & 3.9 dSm-1 and One sample is injurious to crop which is having Electrical conductivity of 4.6dSm-1. The remaining samples are suitable for cultivation of paddy crop. High Electrical Conductivity of samples could not be attributed to the aqua culture activity in the area. There is a possibility that the

soil may have high electrical conductivity due to close proximity of the saltwater creek in the area. The Agriculture department recommended for application of farm yield manure and lime for the paddy fields which are having high electrical conductivity. They further reported that as per the crop cutting experiment results for the past 5 years there is no yield loss to the paddy fields in the subjected areas. Hence, there may not be any requirement of compensation distribution to the paddy farmers.

OTHER RECOMMENDATIONS

1. APPCB collected the water samples from the water bodies when there was less water, about 10% of its maximum holding capacity. APPCB/ Fisheries department shall collect samples from the water bodies in the area on monthly basis for a period of six months to ascertain the actual scenario on a holistic basis.
 2. The aqua ponds are located in the Aqua Zone earmarked by the Government of Andhra Pradesh. Hence, environmental compensation need not be imposed on the aqua ponds. However, they may be directed to obtain necessary approvals before starting the aquaculture activity in the area.
 3. The Fisheries Department may provide an Online TDS Meter at the outlet of Mallam Tank which is leading to the paddy fields. This is required to ascertain the Salinity of water used for agriculture. In case of TDS values in an outlet in excess of the permissible values, the Government authorities may take immediate remedial measures to regulate the entry of saline water streams into the Mallam Tank.
- A copy of the report submitted by the JNTUK is herewith enclosed as annexure.
10. The Hon'ble National Green Tribunal considered the report and reviewed the case on 31.01.2022. The Hon'ble NGT reviewed the case on 31.01.2022 and directed as below:

"In the meantime, we have also received a letter petition from Mr. B. Ravindra Reddy whose land is situated in Survey Nos.641/2, 643/1 & 645/2 Kota Village,

Kota Mandal of Nellore District stating that on account of the activities committed by the shrimp culture units, damage has been caused to his property, and he is not able to do with cultivation. He was also produced certain photographs showing the nature of damage cause. The Joint Committee appointed by this Tribunal is directed to consider that aspect as well and to file a report in this regard.

The committee is also directed to file a detailed report showing the details of the nature of yield obtained by the applicants before these shrimp culture units have been established in those agriculture lands and what is the present yield that has been obtained by them or whether such pollution has prevented from doing the agricultural activity and if that be the case what is the amount of compensation that has to be imposed.

The above officials are directed to ascertain the nature of damage caused to the soil and what is the nature of remediation to be done for the purpose of restoring the contamination, if any, to be caused to the soil and who are responsible for the same depending upon the pro-rata contribution made by the alleged violators causing pollution to the neighbouring agriculture lands.

The learned counsel appearing for Andhra Pradesh Pollution Control Board (APPCB) also wanted some time to submit their further details of the demolition done with survey numbers and also the report about the details furnished by the counsel appearing for the applicant regarding survey numbers where such illegal activities are still continuing after making further verifications. These things can also be considered by the Joint Committee while submitting their further report.

The Andhra Pradesh Pollution Control Board (APPCB) as well as the Joint Committee are directed to ascertain as to whether those units who have obtained necessary permission, have committed any violations of the conditions imposed on account of which pollution has been caused. If that be the case what is the amount of compensation to be realised from them. These aspects were also not answered by the committee while submitting their either in the present

report or in the earlier reports filed. So these aspects will also have to be considered by them while submitting their further report.

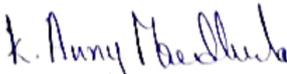
11. Accordingly, the joint committee examined the claim of Sri B. Ravindra Reddy, who is claiming the crop damage in Sy.No.641/2, 643/1 and 645/2 of Kota Village of Kota Mandal, SPSR Nellore. The Committee noticed that there is no paddy crop raised in the said fields for the past 7 years and hence the question of damage caused to the said fields doesn't arise due to shrimp cultivation. The shrimp culture is also at a distance beyond 100m from the subjected land.
12. The analysis results clearly indicate that the agricultural fields are fit for cultivation of the paddy & there is no reduction in yield of paddy in the subjected areas.

Remarks & Recommendations of the Committee:

The Joint Committee humbly submits to the Hon'ble NGT that the fisheries department along with the line departments demolished all illegal aqua ponds in the area, thereby the chance of contamination of the Mallam tank was minimised. The petitioner submitted a copy of the 1st report of the joint committee which was submitted to the Hon'ble NGT, which was prepared with the meager data at that time. It is pertinent to submit that the Hon'ble NGT did not consider that report and also commented it as a **vague** report in the Order dt: 26.02.2021 and issued fresh directions to the Committee. Hence the papers submitted by the applicant during the hearing held on 25-7-2022, which are not new documents, as submitted earlier that these documents already produced before this Hon'ble Tribunal along with 1st joint committee report.


K. Briniga Nalk,
District Fisheries Officer,
Tirupati District

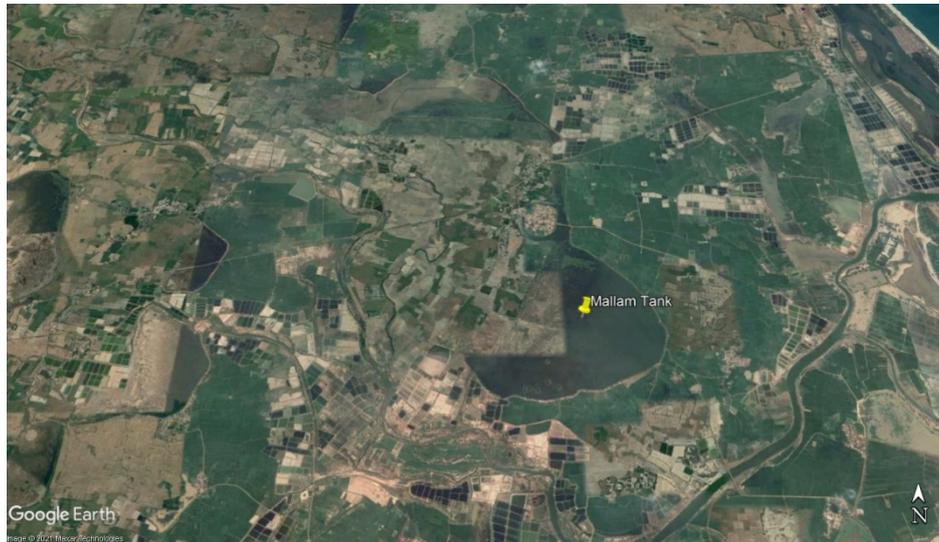

Ch. Rajasekhar
Environmental Engineer,
A.P., Pollution Control Board,
SPSR Nellore


K. Anny Mrudhula
Senior Scientist (Agro)
& Head, Saline Water Scheme,
Bapatla


A. Antony Xavier
Director (Technical)
Coastal Aquaculture Authority,
Chennai


V. Muralikrishna
Revenue Divisional Officer Gudur,
Tirupati District

PRELIMINARY REPORT
ON
ASSESSMENT OF ENVIRONMENTAL DAMAGE
DUE TO ILLEGAL SHRIMP CULTURE IN MALLAM TANK AREA
CHITTAMUR MANDAL,
SRI POTTI SRI RAMULU NELLORE DISTRICT.



SUBMITTED BY

Dr. KVSG Murali Krishna
Professor of Civil (Environmental) Engineering
& Director Green Campus Initiatives
Jawaharlal Nehru Technological University
Kakinada-533003, A.P., India.

1. INTRODUCTION :

- 1.1. Aquaculture is a significant and continuously growing food production sector. In many cases it provides livelihood, income and employment and can significantly contribute to supply of much needed protein and food security in general. However, aquaculture practices can cause negative effects, including social, economic and environmental impacts. As a result concerns have been expressed about the overall environmental sustainability of aquaculture practices and criticism has been voiced against aquaculture developments.
- 1.2. During the month of October 2019, several agriculture farmers represented the District Administration, SPSR Nellore District on the unauthorized Aqua cultivation, release of contaminated water from the Aqua ponds to the feeding channels of Mallam Tank, by which the Mallam tank was contaminated. Various departments initiated action on the un-authorized aqua ponds. Meanwhile, some of the farmers from the Chittamuru Mandal had approached the Hon'ble National Green Tribunal, South Zone, Chennai by filing vide original Application No. 114 to 122 of 2020 (SZ). The District Administration constituted a joint committee comprising of the different departments viz. Fisheries, APPCB, Agriculture University, CAA and Revenue Department. The committee submitted the report to the Hon'ble National Green Tribunal on 10.06.2021. The Hon'ble Green Tribunal, Chennai heard the case and vide order dt: 10.06.2021 issued the following order:

“9. It is seen from the report that there are large numbers of unauthorized shrimp culture and prawn culture farms but it is not mentioned in the report as to what is the nature of action taken by the regulators to remove the unauthorized shrimp farms. They are only putting the blame from one department to another department.

10. The Pollution Control Board (PCB) had filed a counter affidavit showing the details of the quality of the water and collecting water samples from Puli Kaluva, Etigattukaluva, Mallam Tank and Pedakamanuvagu and found

the presence of saline water in these water bodies. But they have not mentioned anything about the water bodies namely, Royyalakaluva and Palamaduguvagu and they have mentioned about the fixing of pipes in the place of bunds to drain contaminated and highly salinity water in Puli kaluva, Yetiggattukaluva and Swarnamukhi (Royyalavagu). But they have not mentioned about the fixing of such unauthorized pipes and whether any sample has been taken from the those outlets so as to ascertain the nature of effluents that is being discharged from the unauthorized shrimp culture farms. They have also not conducted any soil or sediment test either from the agricultural land or from the water bodies, so as to ascertain as to how far this has affected the water body and the soil fertility in order to assess the compensation payable to the agriculturists whose lands are affected on account of the same.

11. They have also not mentioned about the illegal extraction of ground water and if so what is the nature of action taken for these purposes.

12. It is mentioned in the counter affidavit by Andhra Pradesh Pollution Control Board (APPCB) that Government of Andhra Pradesh had issued New Act (Act 29 of 2020) Andhra Pradesh State Aqua Culture Development Authority Act, 2020 duly incorporating penal provisions on the unauthorized aqua farms.

13. But it may be mentioned here, that the above act will not prevent the regulator Andhra Pradesh Pollution Control Board (APPCB) from taking action against offenders who are causing pollution caused to the water bodies and contamination of the soil on account of the activities of these shrimp culture units, as alleged in the complaint filed by the applicants.

14. Further if the Pollution control Board feels that such type of activities should also brought under their regime of the consent mechanism, then they will have to evolve a policy for the purpose of including them also in the consent mechanism if they are convinced that such activities are likely

to cause greater pollution to water and that will have to be regulated in order to protect the quality of the water in the area.

15. The Pollution Control Boards are having power in view of the directions given by the Central Pollution Control Board (CPCB) bringing pollution activities within the purview of the consent mechanism.

16. Under such circumstances, we direct the individual authorities who are the regulators to regulate such activities to file independent reports regarding the action taken by them against persons who are perpetrating illegal activities causing pollution and causing damage to environment and apart from the committee to file a detailed report regarding the further action and also the gap that has been pointed out by this Tribunal regarding the non-mentioning of certain issues that have been projected in the application and also give a further report regarding the progress of the implementation of the recommendations made by the committee to resolve the issues and assess the environmental damage caused and also assess the environmental compensation for fixing the liability on those persons who are responsible for the same while conducting proper study including any expert whom they feel necessary to be co-opted for that purpose and submit a further action taken report as directed before this Tribunal on or before 27.08.2021 by e-filing in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per rules.

17. The regulators are directed to take immediate steps by following the rules in vogue for closure of the unauthorized units and also disconnection of power supply and they should not be allowed to continue their operation. If it is not done by the authorities, then the persons responsible will be taken to task by this Tribunal for not implementing the directions of this Tribunal in its letter and spirit. But before taking coercive steps, they are directed to follow the procedure to be followed in accordance with law.

18. *The Aqua Culture Authority, Fisheries Department and also the District Collector were made members of the committee. If they are coming within the regime of those authorities and when it is brought to their notice about such large scale violation, they are expected to take strict action against those violators in accordance with law and to come with a proper report as what is the nature of action taken by them to remove the unauthorised shrimp culture farms which are causing pollution to the soil as well as water.*

19. *Further the committee has expressed their inability to assess the environmental compensation as according to them further study will have to be done by the agricultural department. If such a study has to be conducted, there is no bar for the District Collector to include such a person also in the committee to assess the environmental compensation and also compensation payable to the neighboring agricultural persons who have come with an application claiming compensation as well.*

20. *The Andhra Pradesh Pollution Control Board (APPCB) being the regulator is expected to give the methodology by which the contamination caused to the ground water and the soil can be restored and assess the amount required for restoration and also make the persons responsible for the same while applying 'Polluter's Pay Principal' depending upon the contribution made by the individual unauthorized owners of the shrimp culture farms and also depending upon the nearness to the property to which the damage has been caused by their activities.*

21. *The Registry is directed to communicate this order to the members of the committee and also to the official respondents by e-mail immediately so as to enable them to comply with the direction.*

22. *For appearance of parties, on whom notice has not been served, filing independent written statements by the official respondent and the party respondents and also for consideration of further reports, post on 27.08.2021."*

1.3 In this regard, the Andhra Pradesh Pollution Control Board collected the samples from the water & sediment samples from the channels, Mallam tank and ground water from the villages. Further they requested the JNTUK for the following tasks:

1. *To suggest the remedial measures to be taken for the purpose of restoring the damage caused to the environment.*
2. *To assess the amount required for restoration.*
3. *To evolve the methodology to assess the environmental compensation on the un-authorized shrimp farmers.*
4. *To evolve the methodology to assess the compensation to the farmers for whose lands were affected.*

1.4 Accordingly, the team from the JNTUK inspected the area on 11th August, 2021 and studied the available data.

2. STUDY AREA:

2.1 The river Swarnamukhi is an east flowing river. It grows at an attitude of 300 m in the Eastern Ghat ranges near Pakala village in Chittoor District of Andhra Pradesh. It runs for a length of 130 Km and finally joins into the Bay of Bengal near Pamanji Village of Vakadu Mandal. Tsallakaluva & Royyalakaluva both are tributaries to Swarnamukhi River. Tsallakaluva a branch of Swarnamukhi takes off at left from Swarnamukhi River at Gudali Village in Kota Mandal. Tsallakaluva runs completely in Kota Mandal until it joins in Swarnamukhi River near GovindaPalli Village of Kota Mandal. Kota Anicut & Jarugumalli Anicut are constructed across Tsallakaluva to Irrigate an ayacut of 8000 acre in Kota Mandal. RoyyalaKaluva a branch of Swarnamukhi river takes off at right from Swarnamukhi river near Vemuguntapalem village in Naidupeta Mandal. Royyalakaluva runs in Naidupet, Vakadu&ChittamuruMandals and finally joins in the Salt creeks near Raviguntapalem Village of Vakadu Mandal. Mallam Anicut is a Minor Irrigation Scheme constructed across Royyalakaluva, the Mallam tank supply channel called as Puli kaluva by the locals takes off left from Mallam Anicut

near Eswarvaka Village of Chittamur Mandal. Puli Kaluva is the feeder channel to Mallam Minor Irrigation tank in Chittamur Mandal & Thirumuru Minor Irrigation tank in Vakadu Mandal. The Channel was designed to carry a discharge of 150 cusec and to irrigate an ayacut of 3238 acre. Yetigattu Kaluva which takes off at right of Mallam tank supply channel (Puli Kaluva) near Muttembaka Bridge is a direct feeder channel to the Agriculture fields in Pittuvanipalli, Padarthivari Kandriga & Ranghanadhapuram Villages in Chittamuru Mandal. Palamaduguvagu is a Drain that carries excess flood water from Mallam tank supply channel. All these channels carry fresh water during monsoon periods.

3. Analysis Results:

- 3.1. The A.P. Pollution Control Board collected water samples from Puli Kaluva, Etigattu Kaluva, Mallam tank and Pedakamanu Vagu on 26.09.2019. As per the analysis reports, the TDS values are in the range of 4656- 10,822 mg/lit; COD values are in the range of 48-80 mg/lit, and BOD values are in the range of 12-20 mg/lit. The analysis results are tabulated below:

Point of Sample collection	Parameters	Value
Puli Kaluva Near Etigattu Thumu, Chittamuru (M)	pH	7.85
	Total Suspended Solids (TSS) in mg/lit	28
	Total Dissolved Solids (TDS) in mg/lit	4656
	Chemical Oxygen Demand (COD) in mg/lit	50
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	12
Puli Kaluva Near Pittuvanipalli, Chittamuru (M)	pH	7.79
	Total Suspended Solids (TSS) in mg/lit	31
	Total Dissolved Solids (TDS) in mg/lit	4875
	Chemical Oxygen Demand (COD) in mg/lit	56
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	15
Etigattu Kaluva, Pedarthivari Kandriga, Chittamuru	pH	7.60
	Total Suspended Solids (TSS) in mg/lit	35

(M)	Total Dissolved Solids (TDS) in mg/lit	5832
	Chemical Oxygen Demand (COD) in mg/lit	48
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	10
Mallam tank, Near Pallemparthri Junction, Jalapeddipalem Chittamuru (M),	pH	7.77
	Total Suspended Solids (TSS) in mg/lit	16
	Total Dissolved Solids (TDS) in mg/lit	5122
	Chemical Oxygen Demand (COD) in mg/lit	80
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	20
Pedakamanuvagu, Near Pittuvanipalli , Chittamuru (M)	pH	7.76
	Total Suspended Solids (TSS) in mg/lit	18
	Total Dissolved Solids (TDS) in mg/lit	6728
	Chemical Oxygen Demand (COD) in mg/lit	67
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	18
EtigattuKaluva, Near Thagedamma temple, Ranganathapuram, Chittamuru (M)	pH	7.52
	Total Suspended Solids (TSS) in mg/lit	84
	Total Dissolved Solids (TDS) in mg/lit	10822
	Chemical Oxygen Demand (COD) in mg/lit	56
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	15

3.2. Water samples were collected from Puli Kaluva, Etigattu Kaluva, Mallam tank & Pedakamanuvagu on 25.07.2020. As per the analysis reports, the TDS values are in the range of 4800- 16,976mg/lit ; COD values are in the range of 52-68 mg/lit and BOD values are in the range of 5-10.4 mg/lit. The analysis results are tabulated below:

Point of Samples collection	Parameters	Value
PedakamanuVagu, near Pittuvanipalli	pH	7.31
	Total Suspended Solids (TSS) in mg/lit	14
	Total Dissolved Solids	8810

	(TDS) in mg/lit	
	Chemical Oxygen Demand (COD) in mg/lit	56
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	8.4
EtigattuKaluva, Near Thagedamma temple, Ranganathapuram	pH	7.18
	Total Suspended Solids (TSS) in mg/lit	12
	Total Dissolved Solids (TDS) in mg/lit	16976
	Chemical Oxygen Demand (COD) in mg/lit	68
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	10.4
Aqua pond at Puli Kaluva, Near Pittuvanipalli (V)	pH	6.69
	Total Suspended Solids (TSS) in mg/lit	16
	Total Dissolved Solids (TDS) in mg/lit	7152
	Chemical Oxygen Demand (COD) in mg/lit	44
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	6.2
Aqua pond at EtigattuKaluva, Pedhavarthivari Kandriga (V)	pH	6.67
	Total Suspended Solids (TSS) in mg/lit	10
	Total Dissolved Solids (TDS) in mg/lit	4800
	Chemical Oxygen Demand (COD) in mg/lit	36
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	5.0
Puli Kaluva , Near EtigattuThumu, Chittamuru (M)	pH	7.10
	Total Suspended Solids (TSS) in mg/lit	18
	Total Dissolved Solids (TDS) in mg/lit	10530
	Chemical Oxygen Demand (COD) in mg/lit	60
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	9.0
Puli Kaluva , Near Pittuvanipalli, Chittamuru (M)	pH	7.28
	Total Suspended Solids (TSS) in mg/lit	22
	Total Dissolved Solids (TDS) in mg/lit	5680

	Chemical Oxygen Demand (COD) in mg/lit	52
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	7.8
EtigattuKaluva , Pedhavarthivari Kandriga, Chittamuru (M)	pH	7.15
	Total Suspended Solids (TSS) in mg/lit	16
	Total Dissolved Solids (TDS) in mg/lit	8124
	Chemical Oxygen Demand (COD) in mg/lit	64
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	9.2
Mallam tank Near Pallemarthri Junction, Jalapeddipalem, Chittamuru (M)	pH	7.13
	Total Suspended Solids (TSS) in mg/lit	14
	Total Dissolved Solids (TDS) in mg/lit	7200
	Chemical Oxygen Demand (COD) in mg/lit	48
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	7.0

3.3. Further, APPCB collected water samples from the Mallam tank and Puli Kaluva on 16.03.2021. As per the analysis report dated 16.03.2021, the TDS values are 607-1710 mg/lit, COD values are in the range of 20-28 mg/lit; BOD values are in the range of 3.6-4.6 mg/lit. The analysis results are tabulated below:

Point of Samples collection	Parameters	Value
Mallam tank near Mallam village	pH	6.71
	Total Suspended Solids (TSS) in mg/lit	20
	Total Dissolved Solids (TDS) in mg/lit	810
	Chemical Oxygen Demand (COD) in mg/lit	20
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	3.6
Canal located towards east side of the Mallam tank which is leading to agricultural fields	pH	6.82
	Total Suspended Solids (TSS) in mg/lit	18
	Total Dissolved Solids (TDS) in mg/lit	818
	Chemical Oxygen Demand (COD) in mg/lit	24

	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	4.2
Puli Kaluva, Near Mallam village	pH	6.99
	Total Suspended Solids (TSS) in mg/lit	21
	Total Dissolved Solids (TDS) in mg/lit	1710
	Chemical Oxygen Demand (COD) in mg/lit	28
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	4.6
Puli Kaluva at the bridge located Vakadu- Chittamuru village	pH	7.17
	Total Suspended Solids (TSS) in mg/lit	16
	Total Dissolved Solids (TDS) in mg/lit	607
	Chemical Oxygen Demand (COD) in mg/lit	20
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	3.4

- 3.4. The A.P. Pollution Control Board has collected samples from the Mallam tank and its surrounding villages on 25.06.2021. As per the analysis report dated 15.07.2021, the analysis results are tabulated below:

Water Channels & Mallam tank:

Point of Samples collection	Parameters	Value
Royyalavagu, Near Thagethamma temple, Mallam (V), Chittamuru (M)	pH	6.99
	Total Suspended Solids (TSS) in mg/lit	12
	Total Dissolved Solids (TDS) in mg/lit	14322
	Chemical Oxygen Demand (COD) in mg/lit	44
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	8.4
Palamaduguvagu, Pittuvanipalli (V), Chittamuru (M).	pH	6.87
	Total Suspended Solids (TSS) in mg/lit	10
	Total Dissolved Solids (TDS) in mg/lit	13194
	Chemical Oxygen Demand (COD) in mg/lit	36
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	7.0

Mallam tank at Thunadalu, Gd Road, Nidigurthy Road, Mallam (V), Chittamuru (M).	pH	7.23
	Total Suspended Solids (TSS) in mg/lit	18
	Total Dissolved Solids (TDS) in mg/lit	5336
	Chemical Oxygen Demand (COD) in mg/lit	40
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	8.2
Mallam tank near Jalagarthipalem(Nagarukomma Temple), Nidigurthy Road, Mallam (V), Chittamuru (M).	pH	7.32
	Total Suspended Solids (TSS) in mg/lit	16
	Total Dissolved Solids (TDS) in mg/lit	5487
	Chemical Oxygen Demand (COD) in mg/lit	36
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	7.0
Zomaral tank, Mallam (V), Chittamuru (M).	pH	7.65
	Total Suspended Solids (TSS) in mg/lit	20
	Total Dissolved Solids (TDS) in mg/lit	1318
	Chemical Oxygen Demand (COD) in mg/lit	52
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	9.4
Etigattukaluva, Pedhavarthivari Kandriga (V), Chittamuru (M).	pH	7.76
	Total Suspended Solids (TSS) in mg/lit	16
	Total Dissolved Solids (TDS) in mg/lit	12587
	Chemical Oxygen Demand (COD) in mg/lit	32
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	6.8
Puli kaluva at Muttumbakam (V), Vakadu (M).	pH	7.05
	Total Suspended Solids (TSS) in mg/lit	12
	Total Dissolved Solids (TDS) in mg/lit	4861

	Chemical Oxygen Demand (COD) in mg/lit	28
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	5.2

Samples from Aqua ponds which will be discharging effluents into the channels after completion of the aquaculture activity:

Aqua pond of Parri Ravanaiah, Pittuvanipalli (V), Chittamuru (M).	pH	7.09
	Total Suspended Solids (TSS) in mg/lit	12
	Total Dissolved Solids (TDS) in mg/lit	18300
	Chemical Oxygen Demand (COD) in mg/lit	28
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	5.8
Water sample collected at Puli kaluva, Near Pittuvanipalli, Chittamuru (M).	pH	7.08
	Total Suspended Solids (TSS) in mg/lit	14
	Total Dissolved Solids (TDS) in mg/lit	4990
	Chemical Oxygen Demand (COD) in mg/lit	32
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	6.6
Aqua pond of Hemanth Reddy, Pittuvanipalli (V), Chittamuru (M).	pH	6.91
	Total Suspended Solids (TSS) in mg/lit	10
	Total Dissolved Solids (TDS) in mg/lit	11309
	Chemical Oxygen Demand (COD) in mg/lit	32
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	6.4
Aqua pond adjacent to the Puli kaluva, Pittuvanipalli (V), Chittamuru (M).	pH	7.43
	Total Suspended Solids (TSS) in mg/lit	18
	Total Dissolved Solids (TDS) in mg/lit	5569

Aqua pond of Mahesh Reddy, Muttumbakam (V), Vakadu (M).	Chemical Oxygen Demand (COD) in mg/lit	36
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	6.8
	pH	6.71
	Total Suspended Solids (TSS) in mg/lit	16
	Total Dissolved Solids (TDS) in mg/lit	5922
	Chemical Oxygen Demand (COD) in mg/lit	24
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	5.0

GROUND WATER SAMPLES

Bore well water sample collected ZP high school, Mallam (V), Chittamuru (M).	pH	7.65
	Total Suspended Solids (TSS) in mg/lit	8
	Total Dissolved Solids (TDS) in mg/lit	1410
	Chemical Oxygen Demand (COD) in mg/lit	16
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	2.4
Bore well water sample collected at Ranganadhapuram Panchayath, Pittuvanipalli (V), Chittamuru (M).	pH	6.72
	Total Suspended Solids (TSS) in mg/lit	10
	Total Dissolved Solids (TDS) in mg/lit	880
	Chemical Oxygen Demand (COD) in mg/lit	16
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	2.6
Bore well water sample collected at Muttumbakam (V), Vakadu (M).	pH	7.18
	Total Suspended Solids (TSS) in mg/lit	6
	Total Dissolved Solids (TDS) in mg/lit	4608
	Chemical Oxygen Demand (COD) in mg/lit	16
	Biochemical Oxygen Demand (BOD) for 3 days @ 27 ⁰ C in mg/lit	2.4

Bore well water sample collected at Anganwadi primary school, Chittamuru (V & M).	pH	7.27
	Total Suspended Solids (TSS) in mg/lit	8
	Total Dissolved Solids (TDS) in mg/lit	1835
	Chemical Oxygen Demand (COD) in mg/lit	12
	Biochemical Oxygen Demand (BOD) for 3 days @ 27°C in mg/lit	2.2

SOIL ANALYSIS OF THE AGRICULTURAL FIELDS

The Agriculture department collected 31 soil samples from paddy fields and analyzed the pH, Electrical Conductivity, Nitrogen, Phosphorous, Potassium, Sulphur, Boron, Zinc, Ferrous, Manganese and Copper. From the analysis two samples were critical for germination which are having Electrical Conductivity-3.7 & 3.9 dSm⁻¹ and One sample is injurious to crop which is having Electrical Conductivity of 4.6 dSm⁻¹. The remaining samples are suitable for cultivation of paddy crop. They further reported that as per the crop cutting experiment results for the past 5 years there is no yield loss to the paddy fields in the subjected areas.

During the visit of the JNTUK University team on 11.08.2021, samples were collected at the following locations and TDS values were measured. The details are as below:

Sl. No.	Location	TDS in mg/lit
1.	Puli Kaluva near bridge	4180
2.	Aqua pond near Palamaduguvagu	15982
3.	Mallam Tank (North - East corner)	7134
4.	Stagnated water in Mallam Tank	8014

At the time of sample collection, water flow in the channels and Mallam tank is very less. The TDS values will decrease significantly when the water body is filled with adequate rain water.

RECOMMENDATIONS

1. *The remedial measures to be taken for the purpose of restoring the damage caused to the environment.*

The results of the water samples indicate that almost all parameters are within the discharge standards stipulated by the MoEF&CC, Govt. of India. However, the aqua culture activity requires high saline water which is not suitable for paddy fields. Waste water from the aqua ponds contains salts and does not contain harmful chemicals such as heavy metals and phenols. It is required to stop the fresh discharge of saline water effluents into the fresh water bodies when higher saline values are found in Mallam tank inlet. Accumulated salts if any in the water bodies will get diluted during the rains/ floods.

Puli kaluva is the main feeding channel for Mallam tank. The flow in this channel will be high during rains/ floods. In the remaining period, flow will be very less and some of the aqua ponds discharge their effluents (Wastewaters) into the Puli kaluva. It is required to provide a regulator at a suitable location to divert water during non-rainy days to Palamaduguvagu so as to facilitate discharge of saline water into Sea.

2. *Assessment of amount required for restoration.*

Once saline water entry into Mallam tank was stopped, the TDS in the Mallam tank becomes normal. Hence, there is no need for preparation of restoration plan separately.

3. *Evolution of methodology to assess the environmental compensation on the un-authorized shrimp farmers.*

The Fisheries department demolished 110.08 Ha of aqua ponds (175 nos) on 29.07.2021 and 30.07.2021 in presence of the revenue & other department officials. Aqua ponds in 41.63 Ha (66 nos) were not demolished due to court orders. There is meager activity going on in these unauthorized aqua ponds ever since their bunds were demolished i.e. since 30-07-2021.



However, the APPCB may submit to the Hon'ble NGT not to impose Environmental Compensation on the aqua ponds as it is an activity very much similar to the agriculture and most of paddy farmers are showing interest to switch over to the aqua culture to sustain their livelihood.

4. Evolution of the methodology to assess the compensation to the farmers for whose lands were affected.

The Agriculture department collected 31 soil samples from paddy fields and analyzed the PH, Electrical conductivity, Nitrogen, Phosphorous, Potassium, Sulphur, Boron, Zinc, Ferrous, Manganese and Copper. From the analysis two samples were critical for germination which are having Electrical conductivity-3.7 dSm⁻¹& 3.9dSm⁻¹and One sample is injurious to crop which is having Electrical conductivity of 4.6dSm⁻¹. The remaining samples are suitable for cultivation of paddy crop. High Electrical Conductivity of samples could not be attributed to the aqua culture activity in the area. There is a possibility that the soil may have high electrical conductivity due to close proximity of the saltwater creek in the area.

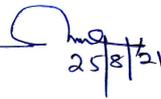
The Agriculture department recommended for application of farm yield manure and lime for the paddy fields which are having high electrical conductivity. They further reported that as per the crop cutting experiment results for the past 5 years there is no yield loss to the paddy fields in the subjected areas. Hence, there may not be any requirement of compensation distribution to the paddy farmers.

OTHER RECOMMENDATIONS

1. APPCB collected the water samples from the water bodies when there was less water, about 10% of its maximum holding capacity. APPCB/ Fisheries department shall collect samples from the water bodies in the area on monthly basis for a period of six months to ascertain the actual scenario on a holistic basis.
2. The aqua ponds are located in the Aqua Zone earmarked by the Government of Andhra Pradesh. Hence, environmental compensation need not be imposed on the aqua ponds. However, they may be directed to obtain necessary approvals before starting the aqua culture activity in the area.

3. The Fisheries Department may provide Online TDS Meter at outlet of Mallam Tank which is leading to the paddy fields. This is required to ascertain the Salinity of water used for agriculture. In case of TDS values in outlet in excess of the permissible values, the Government authorities may take immediate remedial measures to regulate the entry of saline water streams into the Mallam Tank.

Final report will be submitted after evolution of the analysis results of the samples collected for a period of six months.

KVSG → 
25/8/21

Dr. KVSG Murali Krishna.,
Professor of Civil (Environmental) Engineering
& Director Green Campus Initiatives
Jawaharlal Nehru Technological University,
Kakinada.
