



उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड
UTTAR PRADESH POLLUTION CONTROL BOARD

संदर्भ सं०
Ref. No

H 46652/सी-2/वापु-63/आंसी/2020

दिनांक 21-01-2020
Date

To,

The Registrar,
Hon'ble National Green Tribunal,
Copernicus Marg,
New Delhi.

Sub: Compliance report pursuant to the order dated 24-05-2019 in O.A. No. 609/2018 in the matter of Action for Vigilance and Knowledge for Empowerment Vs Lalitpur Power Generation Company Ltd. & Ors.

Sir,

In compliance of order dated 24.05.2019 passed by Hon'ble Tribunal in O.A. No. 609/2018 in the matter of Action for Vigilance and Knowledge for Empowerment Vs Lalitpur Power Generation Company Ltd. & Ors, the committee formed by Hon'ble Tribunal has inspected the unit on 30.07.2019 and the inspection report containing salient details, observations and recommendations is being filed herewith.

It is requested that the inspection report of the committee may be presented before the Hon'ble Tribunal for kind consideration.

Yours faithfully,

Encl: As above.


(Ashish Tiwari)
Member Secretary

Copy to- Shri Pradeep Misra (Advocate) Board Counsel for information and necessary action please.


Member Secretary

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**JOINT INSPECTION REPORT OF LALITPUR POWER GENERATION COMPANY
LIMITED, LALITPUR, U.P**

IN THE MATTER OF

**Action for Vigilance and Knowledge for Empowerment Vs Lalitpur Power
Generation Company Limited & Ors.**
(O.A. No. 609 of 2018)

Background:

Hon'ble NGT, Principal Bench, New Delhi vide its order dated 24.05.2019 in the matter of Action for Vigilance and Knowledge for Empowerment Vs Lalitpur Power Generation Company Limited & Ors (Original Application no. 609 of 2018) has passed following orders:

"We accept the recommendations and direct the project proponent to take remedial measures after drawing up an action plan for mitigation. In particular, the project proponent may ensure use of latest technology instead of electro-static precipitators (ESP) for control of stack emissions. The Committee may examine the action plan and oversee the remedial action. The Committee may also assess the amount of compensation to be recovered on account of harm to the environment for the vicigations caused during the period of default."

Subsequently, Lalitpur Power Generation Company Limited, Vill. Mirchwara & Buragaon, Tehsil-Mehroni, Dist. Lalitpur, UP (Hereafter referred as 'the unit') has submitted action plan on 01.07.2019. Subsequently, joint inspection of the unit was carried out on 30.07.2019 by a joint team of MoEF & CC, Regional Office, Lucknow, CPCB, Regional Directorate (North), Lucknow and UPPCB, Regional Office, Jhansi.

During inspection, the unit was in operation. The salient details, observations and recommendations based on inspection are as below:

01	Name of the industry & Address	M/s Lalitpur Power Generation Company Limited, Vill. Mirchwara & Buragaon, Tehsil-Mehroni, Distt. Lalitpur, UP
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Lalitpur Power Generation Company Limited

Page 1 of 10

02	Name of Contact person with designation	1. Dr. Ajay Vikram Singh, Chief Sustainability Officer 2. Sh. A.N. Sar, Executive Director and Unit Head			
03	Year of commissioning	Unit -1st October 2015, Unit -2 -14th October 2016, Unit -3, 23 December 2016.			
04	Category of Industry	Thermal Power Plant			
05	Installed Capacity	1980MW (3x 660 MW)			
06	Electricity Generated & raw material requirement				
	Description	Electricity Generated (MW)	Raw material requirement per MWH		
			Coal (Kg)	Oil (KL)	Water (KL)
	2019-20 (up to July, 2019)	3297360	0.576	0.00038	2.13
	2018-19	5449920	0.625	0.00048	2.21
2017-18	8565920	0.603	0.00041	2.03	
07	Water consumption & waste water generated (Avg. for July, 2019):				
	S.NO		Water Consumption in KLD	Waste water Generated in KLD	Water Consumption Per KWH
	1	Process	2556	540	0.10
	2	Cooling	48331	1313	1.85
	3	Domestic	301	104	0.10
08	Effluent Treatment facilities provided & Disposal Details				
	<p>a) Ash Pond Overflow –</p> <p>i. Bottom ash dyke-Recycled through Ash Water Recirculation System for reuse in making ash slurry.</p> <p>ii. Fly ash dyke- Recycled through Ash Water Recirculation System for reuse in making ash slurry.</p> <p>b) Boiler Blow Down – Treated through ETP and sent for slurry preparation</p> <p>c) Cooling Tower Blow Down –Sent for slurry preparation</p> <p>d) Plant Waste Water – Treated in ETP and used for dust suppression and ash slurry preparation.</p> <p>e) Domestic Waste Water- Treated through STP and used for horticulture purpose.</p>				
09	Status of consents & Authorization (Validity)	<p>a. Air Consent-Valid upto 31.12.2020</p> <p>b. Water Consent- Valid upto 31.12.2020</p> <p>c. HW Authorization- Valid till 17.07.2023</p>			
10	Fuel Consumption				
	Sr. No.	Type of Fuel	Fuel Consumption		
			2019-20 (Till July, 2019)	2018-19	2017-18
	1	Coal	1900636	3405301	5170529
2	Furnace oil	1249.52	2603.84	3558.12	

Details of Coal being utilized:								
Year		Coal Consumption			% Ash	% Sulphur	Calorific Value	
2019-20 (Till July,2019)		1900636			33.20	0.40	3872	
2018-19		3405301			33.28	0.42	3608	
2017-18		5170529			32.93	0.46	3841	
11 Stack Details and Source Emission Status								
Sl. No.	Stack Attached to	Date of Monitoring	Power Generation Capacity	Plant load	ESP Field		Stack Ht. (M)	PM (mg/Nm ³) (As per OCEMS value on date of inspection)
					Total	Operational		
01	Unit-I	30.07.2019	660	363	72	71	275	32.8
02	Unit-II	30.07.2019	660	371	72	71	275	35.9
03	Unit-III	--	--	--	--	--	--	--
Consented Limits:50mg/Nm³								
12 Pollution Control Measures adopted for fugitive emission control:								
The following measures adopted by the unit:								
<ul style="list-style-type: none"> • Pre-wetting system for coal unloading wagons • Dust suppression system at Coal unloading stations • Dry fog dust suppression installed at coal conveyor junction towers. • Dust extraction system installed over coal bunkers to collect the fugitive dust • Water sprinkler installed in coal stock yard for wetting the coal • At ash silos pneumatic chutes provided for ash evacuation in fly ash bulkers. • Silo area is covered with fabric curtain to contain the fugitive emission if any. • Surrounding area of ash silos, water sprinklers are mounted to control fugitive emission • Two tier plantations • Water sprinkling tanker to suppress the dust on road 								
13 Hazardous Waste Status (2018-19):								
Sl. No.	HW Generated	Authorized Quantity	Quantity Generated (2018-19)	HW storage & Disposal facility				
01.	Used Oil	6.0 KL/Annum	13.75 KL	Sent to registered recyclers				
02.	Waste Oil	0.9 MT/Annum	0.084 MT	Sent to registered recyclers				
03.	Waste oil residues	0.6 MT/Annum	0.091MT	Sent to registered recyclers				

	04.	Spent ion exchange resin	Authorization has been applied to UPPCB.
	05.	Discarded containers	
	06.	Sludge from WTP	
14	Ash Management (2018-19)		
	A)	Fly Ash Generation-	943579 MT
	B)	Bottom ash generation-	189856 MT
	C)	Measures taken for ash handling/ collection/disposal - Dry fly ash is partially collected through Dry Ash Collection system and transported through closed Bulker/trucks. Remaining fly ash and Bottom ash is made slurry and pumped to the ash dykes.	
	D)	Details of silos- Number & capacity- Silos- 06 Nos. Capacity- 2000MTx2+ 500MTX4 =6000MT	
	E)	Fly Ash (FA) Utilization/Disposal (As reported for 2018-19)	
	Sl. No.	Utilisation For	Quantity (MT)
	01	Brick Manufacturing	7879
	02	Cement Industries	586707
	03	Road Construction and Land Filling	00
	04	Ash Dyke Raising	00
	05	Mines Filling	00
	06	Low lying Area Filling	584955
	07	Other utilization	00
	F)	Details of Ash Dykes (Nos., Area) -The unit has 03 Dyke having total area of 82 Ha, Cap- approx. 62 Lac m ³ , Age- 2 operational years, Life- 5.5 years on 50% FA(Fly Ash) utilization & 10 yrs @ 85% FA utilization	

Observations:

1. M/s Lalitpur Power Generation Company Limited is coal based thermal power plant of total capacity 1980MW (3X660 MW). During inspection, only Unit-1 & 2 were in operation with present power generation of 363 MW and 371 MW respectively. It was informed by the unit representative that Unit-3 is closed since last 06 days due to some technical reason.

2. The unit receives coal from CCL mines (Magaz, Amrapali, Ashoka, Piparwar, Urimari, Dhori etc.), NCL mines (Jayant, Dudhichuwa, Kharia, Krishnashila, Bina etc.), WCL (Rawankhas, Gokul, Murdhan, Amredh etc.) and SECL mines (KoriaRewa, Bakunpur, Charcha, Katora, Rajnagar RO, Bijori, Bhatgaon etc). The unit gets coal transported from these mines through railway.
3. The unit has Water and Air consent valid upto 31.12.2020. The unit has HW authorization for used oil, waste oil and Filter Contaminated with Oil, which is valid upto 17.07.2023. However, authorization for spent ion exchange resin, discarded containers, sludge from WTP is under process with UP PCB.
4. The unit is meeting its water requirement from Kachnauda Dam (19 km from the unit) and Rajghat Dam (50 km from the unit) through pipeline. The unit has been granted permission by UP Irrigation Department for 10 Cusec water from Kachnauda Dam and 60 Cusecs from Rajghat Dam. As informed, the unit has also been granted permission to take 10 Cusec of water from Shahzad Dam. However, presently, the unit is not taking water from the Shahzad Dam as pipeline is not laid down.
5. The unit has provided 02 reservoirs with capacity of 29 lac litre and 12 lac litres for storage of water from Dam. The unit has 03 pumps with capacity 3850 m³/hr. each (01- operational and 02 -standby) at water intake pump and electromagnetic flow meter is installed at the common header of the pipeline. The unit has maintained log book for fresh water consumption. As per log book, the specific water consumption of the unit for July, 2019 is 2.13 m³/MW as against the norms of 3.5 m³/MW.
6. The waste water generated from the unit is treated through ETP, which comprises of following units:
 - a. Oil Separator,
 - b. Collection Tank,
 - c. Stilling Chamber,
 - d. Flash Mixture,
 - e. Flocculator,
 - f. Tube Settler,
 - g. Guard Pond



7. Treated effluent is reused for making ash slurry. During inspection, all effluent is reused for making ash slurry and no effluent was found discharged. Electromagnetic flow meter is installed at the pipeline of the final treated effluent. The unit has installed Online Effluent Monitoring System for Flow, pH, TSS & Temperature and it is connected with CPCB server. Sample was collected from outlet of ETP. Analysis result is presented below:

Sampling locations	Parameters					
	pH	SS (mg/l)	TDS (mg/l)	Phosphate (mg/l)	BOD (mg/l)	COD (mg/l)
Outlet of ETP	7.11	19.3	1607	2.13	12.6	37.4
Standards as per EPA notification S.O.844 (E), dt. 19th Nov.,1996	6.5-8.5	100	--	05	30*	250*

*standard as per UPPCB consent

Sampling locations	Parameters				
	Oil & Grease (mg/l)	Total Cr. (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)
Outlet of ETP	BDL	BDL	BDL	0.22	0.336
Standards as per EPA notification S.O.844 (E), dt. 19th Nov.,1996	20	0.2	1.0	1.0	1.0

8. It is evident from the result that ETP of the unit is complying with the stipulated norms.
9. The unit has installed Sewage Treatment Plant (STP) with capacity 165 m³/day for the treatment of sewage generated from unit. STP comprises of following units:
- Collection Tank,
 - MBBR-1 & 2
 - Settling Tank
 - Secondary Settling Tank
 - Chlorine Contact Tank,
 - Multi Grade Filter,
 - Activated Carbon Filter,
 - Filter Press





10. During inspection, STP was operational. Sample collected from outlet of STP is presented below:

Sampling locations	Parameters							
	pH	SS (mg/l)	Total Phosphorous (mg/l)	BOD (mg/l)	COD (mg/l)	TKN (mg/l)	Total Coliform (MPN/100 ml)	Faecal Coliform (MPN/100 ml)
Outlet of STP	7.48	10.5	2.03	14.2	34.8	18.5	1.7X10 ⁵	7.8X10 ³
Standard as per NGT order dated 30.04.2019- (for discharge on land /irrigation) - others locations	5.5-9.0	50	01	30	150	--	--	Desirable-1000, Permissible -10,000

11. It is evident from the result that STP of the unit is not complying with respect of Total Phosphorous parameter as per Hon'ble NGT vide its order dated 30.04.2019 in the matter of OA No. 1069/2018. However, Faecal Coliform is meeting the Permissible Limit Standards.

12. Treated sewage from the STP is reused in the horticulture.

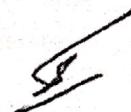
13. Flow meter is installed at the STP and log book for operation of STP is maintained.

14. The unit has installed Online Continuous Emissions Monitoring System (OCEMS) in Stacks and OCEMS is connected with CPCB server. During inspection, the value of OCEMS is as below:

Unit	Parameters		
	PM mg/Nm ³	SO ₂ mg/Nm ³	NO _x mg/Nm ³
Unit-1	32.8	1391	203
Unit-2	35.9	1183	284
Unit-3	**	**	**
Standards	50	200	300

**Unit-3 was not in operation.

15. The unit has to install FGD system for control of SO₂ from stack emission. CPCB has given timeline to complete installation of FGD by December, 2020, February, 2021 and October, 2021 for unit-1, 2 & 3 respectively. It is submitted by the unit that within the stipulated timeline FGD will be installed
16. The unit has provided Four Continuous Ambient Air Quality Monitoring System (CAAQMS) at East (Near Main Gate No. 2), West (Nursery area) and North (Near Gate No. 2, adjacent to admin building) and South (Near CHP). The unit is carrying out monitoring of PM₁₀, PM_{2.5}, NO, NO₂, NO_x, SO₂ and CO.
17. As per EC Condition, the unit shall display ambient level and stack emission level at the convenient location near the main gate of the unit (public domain). The unit has provided digital display board and found working during day of inspection.
18. The unit has Dry Ash Collection System for collection of fly ash. Fly ash is further, transported for different uses as stated. The detail of utilization of fly ash from silos as well as ash dykes as provided by the unit during 2018-19 is mentioned at Sl. No.14 (E) of above table, which shows that % ash utilization of the unit is more than 100%.
19. The unit has provided 2X2000 MT and 4X500 MT dry fly ash collection systems for unloading fly ash to the bulker/closed trucks. During inspection, the unit has provided water sprinklers in the surroundings of ash silos and surrounding at one side to control fugitive emissions. The remaining fly ash and bottom ash is disposed off into ash dyke located within the unit premises. During inspection, fugitive emission was observed at Ash Silo.
20. The unit has provided 02 ash dykes for disposal of bottom ash with capacity 21.86 lac MT & 4.33 lac MT with common decantation well. The overflow water is again reused for making ash slurry.
21. The unit has provided 01 ash dyke for disposal of fly ash of capacity 35.81 Lac MT. The unit has provided Ash Water Recirculation system in ash dyke.
22. The unit has been granted HW authorization for used oil, Waste Oil Residue, Sludge and Filter Contaminated with Oil. The unit send HW to authorised recyclers. The unit has applied for HW authorization for Discarded Containers, Spent Ion Exchange Resin Containing Toxic Metals, and Chemical Sludge from Waste Water Treatment Sludge.



23. The unit has maintained log book of HW generation and its disposal. The unit submitted annual returns of HW generation to UPPCB for 2018-19 on 12.05.2019.
24. As per Hon'ble NGT order dated 24.05.2019, "The Committee may also assess the amount of compensation to be recovered on account of harm to the environment for the violation caused during the period of default". Hence, the committee assess the Environmental Compensation (EC). The EC was assessed from 04.10.2018(date of 1st joint inspection by the committee as per Hon'ble NGT order) to 30.07.2019(date of verification of compliance as per Hon'ble NGT order). The total amount Rs. 90, 00,000/- (Ninety Lac Rupees Only) is calculated as EC, which may be imposed to the unit.
25. As per Hon'ble NGT order dated 24.05.2019, "In particular, the project proponent may ensure use of latest technology instead of electro-static precipitators (ESP) for control of stack emissions.". The unit representative informed that unit is meeting with the stipulated norms of emission with respect of PM parameters with installation of ESP and same is also verified with OCEMS data. However, for control of stack emission with reference to SO₂, CPCB has given timeline to complete installation of FGD by December, 2020, February, 2021 and October, 2021 for unit-1, 2 & 3 respectively and it is submitted by the unit that within the stipulated timeline FGD will be installed. For control of NO_x, it is informed that the unit has installed Low Nox Burner and meeting with the stipulated norms. Same is also verified with the OCEMS results.
26. It is also observed that the unit has been granted HW authorization for generation of 06 KL/Annum of used oil, while during 2018-19, the unit has generated 13.75 KL of used oil, which violates the HW authorization issued by UPPCB.
27. The status of compliance of recommendation made by the joint inspection team are as below:

Sl. No.	Recommendations	Compliance status
1.	The unit should properly operate its STP to meet with the stipulated norms.	Not Complied. The STP is not meeting with the stipulated norms.
2.	The unit should ensure proper operation of CAAQMS.	Complied. The unit is found operating its CAAQMS properly.





3.	The unit should expedite to obtain HW authorization for Discarded Containers, Spent Ion Exchange Resin Containing Toxic Metals, and Chemical Sludge from Waste Water Treatment Sludge.	Not complied. The unit has applied for HW authorization for Discarded Containers, Spent Ion Exchange Resin Containing Toxic Metals, and Chemical Sludge from Waste Water Treatment Sludge on 25.02.2019.
4.	The unit should provide proper approach road such as paved road to ash dykes.	Not complied. It was informed by the unit representative that work order has been placed to contractor for construction of paved road to ash dyke.
5.	The unit should expedite completion of concreting on HDPE lining.	Partially complied. Concreting of HDPE lining on ash dykes were found under process.

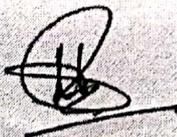
Recommendation(s): -

The industry needs to be directed to comply the followings:

1. The unit should submit the Environmental Compensation (EC) of amount Rs.90, 00,000/- (Ninety Lac Rupees Only).
2. The unit should properly operate its STP.
3. The unit should expedite to obtain HW authorization for Discarded Containers, Spent Ion Exchange Resin Containing Toxic Metals, and Chemical Sludge from Waste Water Treatment Sludge.
4. The unit should expedite to provide proper approach road such as paved road to ash dykes.
5. The unit should expedite completion of concreting on HDPE lining.
6. The unit should ensure compliance of HW authorization with reference to HW generation.

Inspection Team:

1. Dr. Susheel Kumar, Scientist 'C', MoEF& CC, Lucknow
2. Sh. Runa Oraon, Scientist 'D', CPCB, RD(N), Lucknow
3. Sh. Niranjana Sharma, Regional Officer, UPPCB, Jhansi



**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI
(O.A. No. 609/2018)**

Action for Vigilance and Knowledge for Empowerment Vs Lalitpur Power Generation Company Limited & Ors

Name of Industry	Category	Date of 1 st joint inspection	Date of inspection compliance verification	No. of violating days	Environmental Compensation
M/s Lalitpur Power Generation Company Limited, Vill. Mirchwara & Buragaon, Tehsil-Mehroni, Distt. Lalitpur, UP	Red	04.10.2018	30.07.2019	300	90,00,000

Criteria considered for calculation of Environmental Compensation (EC)
 $EC = PI \times N \times R \times S \times LF$

Where, EC is Environmental Compensation in ₹
PI = Pollution Index of industrial sector
N = Number of days of violation took place
R = A factor in Rupees (₹) for EC
S = Factor for scale of operation
LF = Location factor

A. PI (Pollution Index) criteria considers for calculation

For Red category of industries, PI= 80
For Orange category of industries, PI= 50
For Green category of industries, PI= 30
For White category of industries, PI= 10

Here, the ~~CEEP~~ unit comes under Red Category. Hence, PI=80

B. N considers for calculation of period of violation



'N' is the date of violation observed (i.e. date of violation observed by joint inspection team of MoEF& CC, CPCB and UPPCB) and date of compliance observed (here it is considered as date of inspection for compliance verification in compliance of Hon'ble NGT), which will be 300 days.

C. R (A factor in Rupees (₹) for EC) considers for calculation
'R' is Rs. 250/- per day

D. S considers for calculation in terms of scale of operation which may be 0.5 for micro or small, 1.0 for medium and 1.5 for large units. Here, the unit is in Large scale, hence 'S' is 1.5.

E. LF considers for calculation of Location Factor (LF) based on population. The population of nearby City is less than one million and hence LF is considered as '1'

Detailed calculation of EC:

- Where, $P_i=80, N=300$ days, $R=$ Rs. 250/- per day, $S=1.5$ and $LF=1.0$
- Environmental Compensation (EC) per day $= 80 \times 250 \times 1.5 \times 1 = 30,000/-$ per day
- No. of Violating days (N) = 300
- Hence, total EC $= 30,000 \times 300 = 90,00,000/-$ (Ninety Lac rupees only)



**LALITPUR POWER GENERATION COMPANY LIMITED-KJBF-CSR WATER
RESOURCE DEVELOPEMENT ACTIVITY REPORT**

INTRODUCTION AND PROGRAMME AREA PROFILE:

The Bar block of district Lalitpur is diverse, rain fed, risky, under invested, vulnerable, socio-economically heterogeneous, ethnically unique, agrarian and backward relatively to other blocks. It is a hard rock area with limited or inadequate ground water resources, lacks infrastructure, access to improved technologies, markets and inputs with low productivity. Farming system of crops and livestock is the main occupation whereas out sourcing livelihood by seasonal migration minimizes risks and vulnerability. Rainfall in the range of 500 to 700 mm, black, red, mixed and alluvial soils, sufficient surface run off, network of rivers, streams, forests, animals and social capital are the opportunities for a sustained development process. Increased frequency of drought occurrences due to climatic changes, degradation of forest, ground water etc.

The major portion of rainfall is received during month of July and August and sometime in early September. Thus July, August and September are water surplus and remaining months are water deficient months. The distribution of rainfall is very erratic. Low rainfall and droughts are common features of the area. Sometime long dry spells during rainy season are also experienced which adversely affect the crops as experienced, the maximum number of droughts are occurred in the month of September and that too in the later half of the month (3rd and 4th weak). Thus drought condition in second half of September adversely affects standing Kharif crops and timely preparations and sowing for Rabi crops. In the district annual rainfall partitioned into surface runoff (24.7%) and deep percolation (18.40%) is lost. 45.6% of the rainfall water is evaporated due to high temperature and only 9.45% of the annual rainfall is stored in the soil profile which is used for farming systems. It is surprising to note that less than 1% of rainfall water is stored in ponds and bundies etc.

To resolve above problems, in consultation with local community and collaboration with development stakeholders, **Kamalnayan Jamnalal Bajaj Foundation (KJBF)** as part of the corporate social responsibility of Lalitpur Power Generation Company Limited (LPGCL) has been implementing various need based innovative water harvesting structures, promoting efficient and judicious use of available water through less water intensive crops and micro irrigation systems , moving towards holistic cropping pattern.

Water Resource Development:-

It is noticed that water table fluctuations are to the extent of 3.90 meters in Lalitpur. In some Hydro graphical stations like Bar, the water table drops as low as 5.5 meters, thus there are wide fluctuations in the depth of water table recorded in pre and post monsoon periods. Average Yield 5-6 quintal per acre.

For efficient and judicious use of available water and increase the productivity in the surrounded agricultural lands of the poor and marginalized farmer communities so here the project is emphasizing on constructing and reconstructing water bodies and will promote along with less water intensive short duration cash crops. As per the need identified in consultation with local community, Rejuvenation of rivers/streams, construction of check dams, Boribundh has been initiated with active participation of the community.

Construction & Renovation of Check Dam:-

As per the need assessment in consultation with local villagers, various water harvesting structures like check dams have been constructed and renovated on Sajnam and Uttari River to maximize surface water storage as well as recharge of ground water thereby addressing the irrigation need of the farmers. This has resulted in increased water storage in rivers, increased water flow and ground water recharge, area under irrigation and cropping intensity has also been increased due to construction and renovation of series of check dams.

- 11 check dams constructed/renovated
- 829 families benefited
- 4250 acres of rain-fed land covered under irrigation
- 453 Nos. of irrigation wells benefited
- Water harvested in 8,44,019 cubic meter (surface storage*3)
- 5 villages benefited
- Yield increased from 12 quintal per hectare to 16 quintal per hectare (wheat)
- Net income enhanced Rs.2400/-acre.

Rejuvenation of Rivers/Streams

Rivers and streams have been silted up due to damaging of upper catchment area, resulted in reduced water carrying capacity of rivers/streams, reduced water flow, reduced ground water recharge and lesser availability of surface water.

Bringing in the innovations:-

As the work progressed and picked up, KJBF also pinpointed certain changes that ought to be made in the design in order to optimize results. This realization led to three broad innovations.

Bullets points of Innovations:-

- **Excavation of Dug ponds** to increase the storage of water and to increase the rate of recharge
- **Two steps on bund** to minimize rain cuts and reduced soil of bunds or prevent the boxes from siltation
- **Drainage pipes from the field** in to the river to prevent the farm land from water logging of excess rain water

Achievements & Impact:-

- 8 Rivers/streams rejuvenated
- 10.5 Km of length of Rivers/streams rejuvenated
- 3,650 acres of land benefitted
- 695 families/farmers benefitted
- 08 villages benefitted
- 325 Nos. of wells benefitted
- River flow increased from seasonal to 6 to 7 months
- Water table increased up to 6 to 7 Ft.
- Cropping intensity increased from 1 to 2 crops.

Interlinking of Construction / Renovation of water bodies:-

As a result of check dam constructed on Sajnam River and de-silting of Uttari River, back water of sajnam River has reached up to 3.5 KM in Uttari river. Uttari used to be seasonal river, due to perennial flow in Sajnam River, water is available in above 3.5 KM throughout the year Depth of back water in Uttari is on an average 1.0 m. 780 acres land of 251 farmer of Jaravali, lailoni, Taparain , Buragoan ,bachrawani and udaipura were benefitted and brought under irrigation.

Boribundh (Seasonal and Cost-effective Water harvesting structures):-

Temporary seasonal cost effective water harvesting structure established by filling empty cement bags filled up with locally available sand/soil and stacked across the River/stream to harvest rain water. The stacked cement bags are also covered with plastics to minimize leakage of water. After realizing the benefits of Boribundh farmers are motivated. Efforts have been made to train the beneficiaries to construct Boribundhs on their own in the years to come to mitigate their future water needs.

Achievements and Impact:-

- 119 Bori bundh across 12 streams and in Uttari river as well.
- 833 Acres of land benefitted.
- 385 Families benefitted.
- 04 villages covered
- Average yield increased from 12-13 quintal to 16-17 quintal per hectare
- One Bori bundh benefitted near 5 Acres of land
- Average investment in Bori bundh: Rs. 6,000 and average return Rs. 70,000 from 2.5 acres of land.

TRADITIONAL POND, FARM POND AND ABONDEND SAND STONE MINES RENOVATION:-

The main objective of the intervention was to improve water conservation, irrigation facility, and land use pattern leading to increased agricultural productivity in drought prone and desert prone areas of Lalitpur Dist. Poverty reduction, better livelihoods and improved bio-physical and socio-economic environment would bring about sustainable development.

The project noticed changes in ground water level, surface water, irrigation facility, water regeneration capacity, land use pattern, cropping pattern, livestock production, employment generation, income generation and debt reduction, etc. These changes are observed in all water resource development programmes with certain variations. But the changes like land use pattern, cropping pattern, crop diversification, etc. are more prominent in the target area. Some areas need further attention such as greater involvement of the communities during implementation & post implementation phases, training & capacity building, social audit, women participation, and sustainable income generation. The programmes have been examined from the structural and functional dimensions and their effectiveness has been measured from the benefits accrued to various stakeholders.

Objectives of Renovation of Old Water Bodies:-

- ✓ To examine various performance indicators that contribute towards effective implementation of the programme
- ✓ To assess overall impact of the programme on :-
- ✓ Ground water level condition, reduction in soil erosion, increase in surface water and other physical conditions in water resource development and management programme.
- ✓ Land use pattern, cropping pattern and agricultural productivity in the target area
- ✓ Socio-economic and livelihood conditions of the target communities
- ✓ To identifying existing issues and deficiencies (if any) in implementation of the programmes

Impact Assessment

Groundwater recharge and availability:-

The total recharge taking place through natural and water harvesting interventions is greatly affected by the amount of rainfall, its intensity, duration of monsoon, ground and sub-surface characteristic. The total storage capacity of all the water harvesting structures is 9,27,632 Cu. M.. The recharge by all the structures is

computed by area of grounding contact with water, its duration of contact and percolation rate of upper soil strata.

Increase in ground water level:-

Increase in ground water table in target areas is one of the important measurable indicators of successful programme. Various factors are accountable for increase in ground water. The water harvesting structures playing a key role by storing water and allow sufficient time for water to percolate into the ground. Water storage activities such as check dam construction & renovation, nala & river revival, Boribundh etc. and cultivation practices also contribute towards accumulation of ground water. The increased water levels also render some respite in the drinking water situation in the project villages.

Increase in agricultural productivity:-

There is positive change in the land use pattern reported in most of the target area. In this area, more waste land was converted for productive use by the farmers. This has resulted increase in net sown area in majority of the villages. Further, better land use pattern has helped increase in agricultural intensification and thus enhance agricultural production.

Achievements and Impact:-

- 14 Pond-Farmpond constructed/renovated
- 04 Abandoned Sand Stone Mines Constructed
- 965 families benefited
- 3890 acres of rain-fed land covered under irrigation
- 673 Nos. of irrigation wells benefited
- Water harvested in 31, 45,000 cubic meter (surface storage*3)
- 16 villages benefited
- Yield increased from 12 quintal per hectare to 16 quintal per hectare (wheat)
Net income enhanced Rs.2400/-acre.

Note: - WATER RESOURCE DEVELOPMENT Activity details are attach below from FY 2011-12 to FY 2017-18

PHOTOGRAPHS OF WATER RESOURCE DEVELOPMENT ACTIVITIES

