

**Department of Science & Technology
Technology Mission Division (Energy, Water & Others)
Water Technology Research and Innovation Centre's (WATER-IC)**

PROJECT PROGRESS REPORT

Progress Report Serial Number:

(Period: April 2019-March 2021)

1.	DST File No.	DST/TM/WTI/WIC/2K17/83 (G), dated 28.02.2019	
2.	Project Title	Innovation Centre for Eco-prudent Wastewater Solutions (IC-ECOWS)	
3.	Principal Investigator	Dr. V. C. Goyal	Category:
4.	Lead Institution	National Institute of Hydrology (NIH), Roorkee, Uttarakahnd-247667, India	
5.	Co-PIs/collaborators:	Dr. Pradip Kalbar	Category:
6.	Co-PIs/collaborators Institutions	Indian Institute of Technology Bombay, Powai, Mumbai-400076, Maharashtra.	
		Prof. A.B. Gupta, Prof. (Mrs) Urmila Brighu	Category: Category:
		Malaviya National Institute of Technology (MNIT), Jaipur-302017, Rajasthan.	
		Dr. Indranil De	Category:
		Institute of Rural Management Anand (IRMA), Anand-388001, Gujarat.	
		Er. Omkar Singh Dr. Jyoti P. Patil Dr. Rajesh Singh Er. Rohit Sambare	Category: Category: Category: Category:
7.	Date of Commencement	1st April 2019	
8.	Approved Date of Completion	31st March 2024	
9.	Targeted Objectives (Multi-Institution wise)	<p>Objective 1- Establishment of a state-of-art Centre for Eco-prudent Wastewater Solutions (IC-EcoWS) to harness the potential Natural Treatment Systems (NTS) and other eco-prudent resource recovery technologies for water security and sustainability in India. (NIH, IITB, IRMA, MNITJ)</p> <p>Objective 2- Development of a Decision Support Tool (DST) based on Life Cycle Assessment (LCA) and Multiple Criteria Decision Making (MCDM) approach for selection of appropriate “Technology Packages” for resource recovery oriented wastewater treatment infrastructure. (IITB)</p> <p>Objective 3- Establishment of few pilot study sites (“Live Laboratories”) for detailed assessment of selected NTS in urban, peri-urban and rural settings, for both secondary and tertiary treatment requirements as per new CPCB norms as well as for select emerging pollutants. (NIH, IITB, MNITJ)</p> <p>Objective 4-To explore innovative ideas on the development (e.g. use of pre-fabricated structures, efficient structures for control of solid waste in sullage) and application (e.g. retrofitting of existing village ponds, drains, linkage to livelihood options) of NTS for wastewater treatment. (NIH, IRMA)</p> <p>Objective 5-To organize capacity building, awareness creation, documentation and dissemination activities, and preparation of a TOT Module on NTS applications and an Indian handbook for promotion and propagation of NTS for resource recovery and wastewater treatment in India. (NIH, IITB, IRMA, MNITJ)</p>	

Targeted (Institution wise)	Timelines	Out of 8 specific activities to be undertaken in 5 years of the project (Sl.No. 1-8).				
		NIH Roorkee				
Sl. No.	Activity	Year				
		I	II	III	IV	V
3	Exploration of Innovative ideas on the development and application of the NTS for wastewater.					
4	Establishment of few pilot study sites (“Live Laboratories”) for detailed assessment of selected NTS in urban, peri-urban and rural settings					
5	Organization of capacity building, awareness creation, outreach and dissemination activities for promotion and propagation of NTS					
6	Development of a TOT Module on NTS applications					
7	Organization of User Interaction Workshop					
IIT Bombay						
Sl. No.	Activity	Year				
		I	II	III	IV	V
1	Development and application of a decision support tool based on LCA and MCDM approach for selection of appropriate technology packages of NTS					
3	Establishment of few pilot study sites (“Live Laboratories”) for detailed assessment of selected NTS in urban, peri-urban and rural settings					
5	Organization of capacity building, awareness creation, outreach and dissemination activities for promotion and propagation of NTS					
7	Development of Indian Handbook for NTS technology packages					
MNIT Jaipur						
Sl. No.	Activity	Year				
		I	II	III	IV	V
4	Establishment of few pilot study sites (“Live Laboratories”) for detailed assessment of selected NTS in urban, peri-urban and rural settings					

		5	Organization of capacity building, awareness creation, outreach and dissemination activities for promotion and propagation of NTS						
		6	Development of a TOT Module on NTS applications						
		IRMA Anand							
		Sl. No.	Activity	Year					
				I	II	III	IV	V	
		2	Cost Estimation of identified NTS technologies and development of business model for a variety of Technology Packages of NTS						
		3	Exploration of Innovative ideas on the development and application of the NTS for wastewater.						
		5	Organization of capacity building, awareness creation, outreach and dissemination activities for promotion and propagation of NTS						
11.	Accomplishments in Terms of Coordinated and Synchronized Research in the Identified Area among the Institutional Partners:	NIH, Roorkee							
		Activity			Achievements				
		First annual workshop “Inception cum Need Assessment Workshop” convened on 8-9 August 2019 at NIH Roorkee.			<ul style="list-style-type: none"> • Successful completion of the 1st annual workshop. • Workshop Report completed. • Information dissemination and outreach between the stakeholders. 				
		Development of IC-EcoWS Centre’s Portal			<ul style="list-style-type: none"> • Developed a website and social media pages. • IC-EcoWS flyers and Brochure prepared. 				
		International Journal Publications			<ul style="list-style-type: none"> • Paper under revision in <i>Water Environment and Research Journal</i> (2021). • Paper under review in <i>Science of Total Environment Journal</i> (2021). 				
		Innovative Ideas for wastewater treatment using natural treatment system			<ul style="list-style-type: none"> • Established four pilot-scale floating constructed wetland (FCW) cells for evaluation of domestic wastewater treatment efficiency using identified macrophytes species. • Initiated in-situ treatment of domestic wastewater in an urban drain using FCW in Roorkee. • Pilot-scale demonstration of domestic wastewater treatment 				

	from a residential building using FCW for educational purpose.
Establishment of Live-Laboratory for the detailed assessment of Natural treatment System (NTS) for wastewater.	<ul style="list-style-type: none"> Established a sub-surface horizontal-flow constructed wetland (HSSFCW) for the treatment of domestic wastewater from peri-urban residential area in Roorkee. Procurement of online monitoring system (Ongoing)

IIT Bombay

Activity	Achievements
The 6Rs (reduce, reuse, recycle, reclaim, restore and recover) framework proposed for Circular Economy in water sector	Work is published
Literature review of Natural Treatment Systems in India	Documented in report
Survey of NTS installations conducted by floating template of NTS details	Analysis summary presented in report
Site visits at STPs treating wastewater using constructed wetland technology in Delhi, Dharamshala and Jaipur	Learnings documented in report
Report on existing NTS installations and their performance in India	Report submitted
Website for Natural Treatment Technologies	In progress

MNIT Jaipur

Activity	Achievements
Establishment of few pilot study sites ("Live Laboratories") for detailed assessment of selected NTS in urban, peri-urban and rural settings	<ul style="list-style-type: none"> Established lab scale dual mode VFCW Construction of pilot scale VFCW under progress Assessment of ANAMMOX contribution in urban (domestic) and periurban (hospital) CW completed Assessment of antibiotic resistant bacteria in urban (domestic) and periurban (hospital) CW completed DST project on integrated development of village Andhi, Rajasthan involves development of a CW, which will be assessed under this project Analysis of secondary data from VFCW for organics (n=82), nitrogen (n=76) and phosphorous (n=55) removals completed
Organization of capacity building, awareness creation, outreach and dissemination activities for promotion and propagation of NTS	<ul style="list-style-type: none"> Training program on the operation and management of STPs has been organized for LSG officials from 22-25th March, 2021, which includes a complete session on constructed

wetlands.

- A lecture was delivered by Dr A. B. Gupta in an Environmental awareness webinar on February 1, 2021 by Samagram (an NGO) of Udaipur on World Wetland Day.

IRMA

12. Accomplishment in Terms of Milestone for the Review Period:

Objective/ Deliverable	Milestones	Target Month (from start)	NIH-R	IIT-B	MNIT-J	IRMA
Objective 1	Hiring of project staff	M6 (Sep 2019)	Completed	Completed	Completed	Completed
	Development of Centre's portal	M12 (Mar 2020)	Completed	NA	NA	NA
Objective 2	Operation of DST	M24 (Mar 2021)	NA	Ongoing	NA	NA
	Development of Technology Packages	M42 (Sep 2022)	NA	Ongoing	NA	Ongoing
Objective 3	Establishment of Live Laboratories	M18 (Sep 2020)	Ongoing	Ongoing	Ongoing	NA
Objective 4	Development and application of innovative ideas on NTS	M24 (Mar 2021)	Ongoing	Ongoing	Ongoing	Ongoing
Objective 5	Organization of Users Interaction Workshops (annual)	M12, M24, M36, M48, M58	Completed (M12)		To be started (M24)	
	Development of TOT Module on NTS applications	M50 (May 2023)				
	Development of Indian handbook for NTS Technology Packages	M55 (Oct 2023)				
	Submission of final Project Report	M60 (Mar 2024)				

13. A brief Description of Technical/Scientific Achievement for the period (Give 200 words Summary in bulleted format)



NIH Roorkee

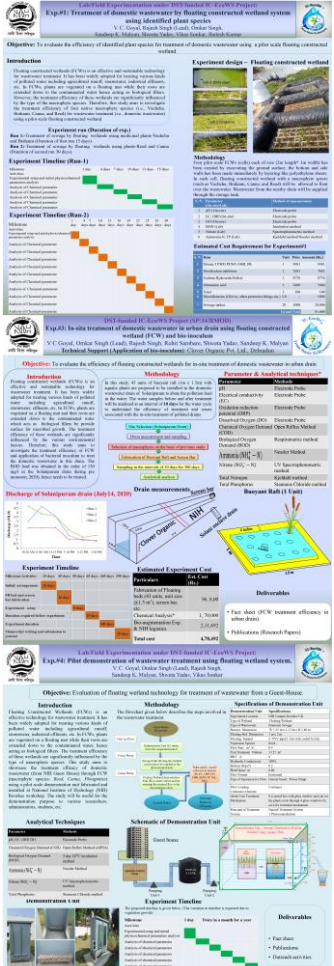
- Successful completion of IC-EcoWS first annual workshop “The Inception cum Need Assessment Workshop” convened on 8-9 August 2019 at NIH Roorkee.
- Developed IC-EcoWS Center’s portal.
- Procured lab/field equipment (eg., Handheld portable multiparameter, Respirometric BOD Apparatus, Cold Cabinet/Freezer, Hot Air Oven, Microbiological Testing Kit with Incubator, and Online Monitoring System (ongoing)
- Established three pilot-scale natural treatment system (mainly floating wetlands) as an innovative component for: (a) Evaluation of domestic wastewater treatment efficiency of identified macrophyte species, (b) In-situ treatment of wastewater in an urban drain, and (c) treatment of domestic wastewater from a residential building (NIH guest house)
- Established sub-surface horizontal-flow constructed wetland for treatment of domestic wastewater from peri-urban residential area in Roorkee and for setting-up the live-laboratory using online monitoring system.
- Submitted two scientific papers in international journals for publication.


IIT Bombay

- Inventory of NTSs installed across India is carried out and report prepared
- 9 site visits by IITB research team were made to various NTSs across India and are documented in the report
- Learning's from inventory and site visits documented in the report.
- A literature review of natural treatment systems operational in India was conducted. A survey was conducted by circulating a questionnaire template to the wastewater practitioners to obtain information about NTS installation details in India.
- The 6Rs (reduce, reuse, recycle, reclaim, restore and recover) framework for the Circular Economy as applicable to the water sector was developed. Further, opportunities and challenges for implementing the same in India were identified.
- Local site visits were conducted in Mumbai and interaction with two wastewater practitioners was scheduled to understand field challenges and opportunities.
- A Workshop on 'Wastewater Treatment and Recycling' was conducted at IIT Bombay in Nov 2019 in association with Material Recycling Association of India, which was attended by several stakeholders including academicians, NGO's, regulators and government officials.
- Site visits to natural treatment systems were conducted by the IIT Bombay team in north India including Jaipur, Dharamshala and Jaipur.
- Based on an understanding of field problems and prevalent regulations, a novel approach of hybrid treatment systems is developed.
- Website for disseminating knowledge about natural treatment systems to wastewater practitioners is currently under development.

MNIT Jaipur

- Design of a "pilot CW" finalized (10 KLD) sewage from RBC of MNIT Jaipur
- Demarcated space for CW for gray water treatment of a Girl's hostel (50 KLD) in MNIT
- Sample Testing from CW receiving residential and Hospital wastewater.
- A lab scale, dual mode VFCW has been established at MNIT, construction of a pilot scale VFCW is under progress.
- The nitrogen mass balance of deep CW operating on domestic and hospital sewage revealed that 16.29% and 20.08 % nitrogen remains unaccounted for in the domestic and hospital CW respectively. The involvement of ANAMMOX process in the transformation of this unaccounted nitrogen was proved using molecular biological methods and metagenomics sequencing. (Publications given below)
- Enumeration and comparative analysis of antibiotic resistant bacteria from the two wetlands in comparison to the MBBR plant located in Jaipur revealed that the performance of CWs was at par with the tertiary treatment of MBBRs in terms of removal of ARBs. (Paper Communicated)
- Upon analysis of secondary data from VFCW, potential correlations were identified between loading and removal rates of COD (n= 82), BOD (n= 82), Ammonical nitrogen (n= 76) and total nitrogen (n= 76), which all yielded linear trends. A majority of field CWs are operated at loading rates well below their limiting values indicating that they have a lot of residual capacity for the removal of substrates. (Paper Communicated)
- Analysis of secondary data from 55 VFCW for phosphorous removal indicated that the removal rates of phosphate are positively correlated with the loading rate. The increased depth of the wetland appears to favour phosphate removal. (Paper Communicated)

		<p>IRMA Anand</p> <ul style="list-style-type: none"> Reviewed literature on appropriateness of NTS from the perspective of economy and institutions Identified the need of transaction cost evaluation of people's participation and co-production Paper submitted for publication in reputed journal
<p>14. Provide details of any Technologies/Prototype/Process /Materials developed</p>	<p>NIH Roorkee</p>  <p>NIH Roorkee</p> <p>Floating constructed wetlands (FCWs) are an effective and sustainable natural-based technology for wastewater treatment. FCWs are used in three pilot scale wastewater treatment system (for domestic wastewater) established in urban settings using <i>Canna Indica</i> and <i>Phragmites Australis</i> species.</p> <p>Horizontal sub-surface constructed wetland (HSSCW), a gravel filled basin planted with vegetation (<i>Canna Indica</i> and <i>Phragmites Australis</i>) in the domestic wastewater in the peri-urban residential area in Roorkee (NIH Colony).</p> <p>IIT Bombay</p> <p>Development of Framework for Circular Economy in Water Sector:</p> <p>The 6Rs (reduce, reuse, recycle, reclaim, restore and recover) framework for the Circular Economy as applicable to the water sector was developed. Further, opportunities of CE which will contribute to reduction of freshwater demand are identified. Also, the challenges for implementing the same in India are reported.</p> <p>Hybrid Treatment System Approach:</p> <p>A paradigm shift in wastewater treatment in India is proposed through the adoption of hybrid treatment systems (HTSs) approach which involves a combination of natural and mechanized treatment approaches for wastewater treatment. The adoption of HTSs will result in energy savings and environmental benefits thereby helping India achieve various national and international commitments of wastewater treatment and recycling.</p> <p>MNIT Jaipur</p> <p>The concept of deep CW has been developed and has been experimented upon for removal of C, N, and P simultaneously with relatively much smaller surface area.</p> <p>IRMA Anand</p> <p>---NA---</p>	<p>NIH Roorkee</p> <ul style="list-style-type: none"> Established a pilot-scale wastewater treatment system with four cells (3 cells of floating wetland, 1 cell without wetland) for evaluation of domestic wastewater treatment efficiency using identified macrophytes species. Established an in-situ wastewater treatment system for domestic wastewater treatment in an urban drain. Established a demonstration unit using floating wetland for wastewater treatment from NIH guest house. Established a sub-surface horizontal-flow constructed wetland for treatment of domestic wastewater from peri-urban residential area in Roorkee and for setting-up a live-laboratory using online monitoring system. <p>IIT Bombay</p> <ul style="list-style-type: none"> ---NA---
<p>15. Achievements in terms of pilot scale /Lab scale/Field scale deployment</p>		<p>NIH Roorkee</p> <ul style="list-style-type: none"> Established a pilot-scale wastewater treatment system with four cells (3 cells of floating wetland, 1 cell without wetland) for evaluation of domestic wastewater treatment efficiency using identified macrophytes species. Established an in-situ wastewater treatment system for domestic wastewater treatment in an urban drain. Established a demonstration unit using floating wetland for wastewater treatment from NIH guest house. Established a sub-surface horizontal-flow constructed wetland for treatment of domestic wastewater from peri-urban residential area in Roorkee and for setting-up a live-laboratory using online monitoring system. <p>IIT Bombay</p> <ul style="list-style-type: none"> ---NA---

		<p>MNIT Jaipur</p> <ul style="list-style-type: none"> • 4 lab scale CWs established. • Construction of pilot scale wetland under progress. • The concept of deep CW has been developed and has been experimented upon for removal of C, N, and P. <p>IRMA Anand</p> <ul style="list-style-type: none"> • ---NA--- 		
16.	Beneficiaries of the Project in terms of SC/ST Community (percentage wise) or benefit for Specific Region			
17.	Shortfalls in Achievements of Activities for the Period	Activity	Shortfall (if any) in specific terms	Responsible Organisation
		Report on Nutrient and Energy Flows	The report work is in progress	IIT Bombay
		Development of pilot scaled wetlands	Slightly delayed due to Covid-19 pandemic	MNIT Jaipur
		Advance analysis of the samples from CWs from different sites	Delay due to Covid-19 pandemic as travel was not permitted	MNIT Jaipur
18.	Add few pictures of the impacted community/site/ plant/product/prototype (if applicable)	<p>NIH Roorkee</p>  <p>Fig. 1a Floating constructed wetland-Pilot scale study at NIH.</p>		

इस्तेमाल योग्य बनेगा नालों का पानी

संबंध रखती है। नालों के गंदे पानी को अब प्राकृतिक रूप से ट्रीटमेंट कर खेती के प्रयोग में लाया जाएगा। राष्ट्रीय जलविज्ञान संस्थान रुड़की ने इसको लेकर एक वाटर ट्रीटमेंट प्लान तैयार किया है। प्रयोग के तौर पर इसकी शुरुआत गुरुवार को सोलानीपुरम स्थित नाले से की गई।

इस मौके पर राष्ट्रीय जलविज्ञान संस्थान (एनआईएच) के निदेशक डॉ. जयवीर ल्यागी ने कहा कि जल मूलभूत आवश्यकता है। वेस्ट ट्रीटमेंट प्लान की मदद से प्राकृतिक रूप से नाले के गंदे पानी को प्रयोग योग्य बनाया जाएगा। नगर निगम महापौर शीवरा मोगल ने बताया कि प्रयोग कामयाब रहने पर एनआईएच के सहयोग से अन्य बड़े नालों पर यह प्लान लागू किया जाएगा। इस दौरान उनकी एनआईएच निदेशक डॉ. जयवीर ल्यागी से शहर की जल संबंधी समस्याओं पर भी चर्चा हुई है। एनआईएच के निदेशक ने उन्हें बताया कि कुष्माण्ड में जलभराव की समस्या से निजात दिलाने के लिए भी उन्होंने एक प्लान तैयार किया है। इससे जलभराव की यह समस्या भी दूर हो जाएगी। इस मौके पर एनआईएच के वरिष्ठ वैज्ञानिक डॉ. विकास चंद्र मोगल, क्लोवर आर्गैनिक्स के निदेशक संजय अय्यंगर, पार्ले देवकी जोशी, रमेश जोशी, अंकार सिंह, डॉ. राजेश सिंह, डॉ. प्रदीप कुमार, डॉ. सुमंत कुमार, डॉ. मुकेश शर्मा, डॉ. संदीप मल्लान, डॉ. सैयिद कुमार, डॉ. दिगंबर सिंह, सूर्यकांत आदि मौजूद रहे।



Fig. 1b Floating constructed wetlands for in-situ treatment of domestic wastewater in urban drain.

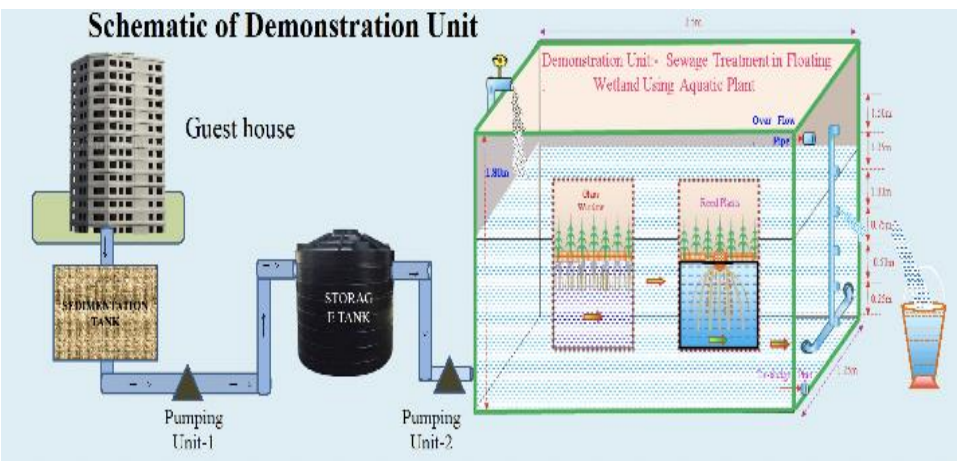


Fig. 1c Floating constructed wetland in demonstration unit



Fig. 2 Horizontal sub-surface constructed wetland (HSSCW) system in peri-urban area, Roorkee.

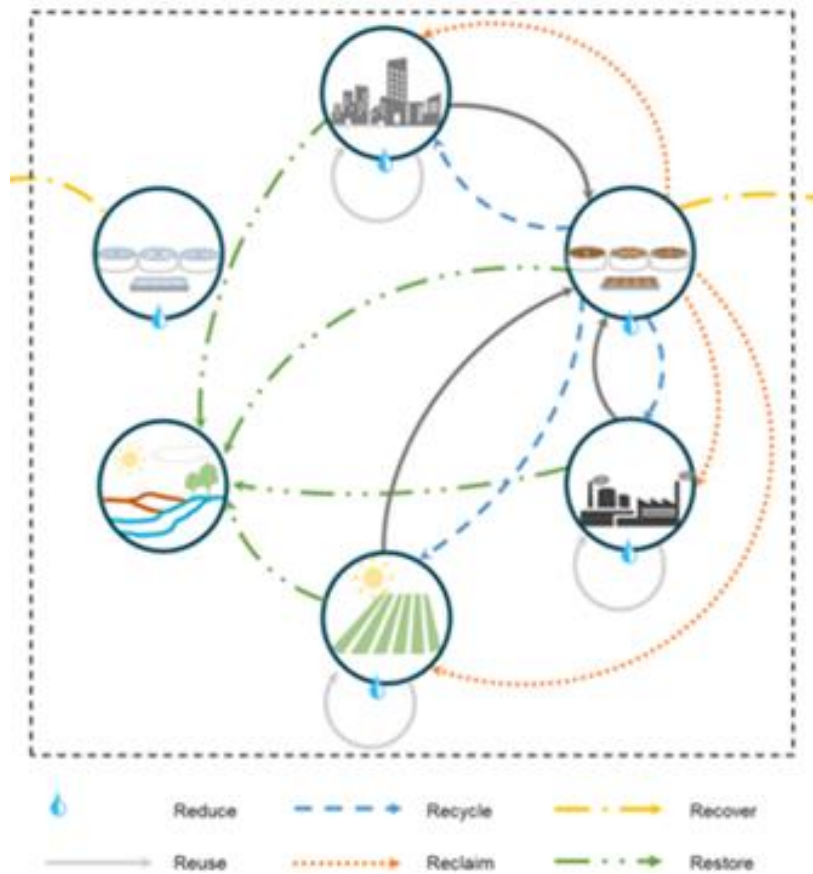


Fig. 3 Circular Economy Framework for Water

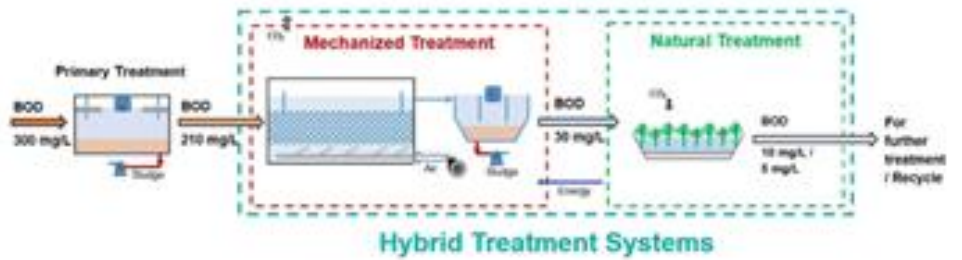


Fig. 4 Hybrid Treatment Systems Approach

MNIT Jaipur



Fig. 5 Lab scale VFCW developed at MNIT (A), Progress of construction work for pilot scale VFCW at MNIT (B, C, D)

IRMA Anand
-NIL-

19.	Journal Publication during the Period	NIH Roorkee		
		Title of the paper	Journal, Issue, Year etc.	Authors
		Mechanistic understanding of the pollutant removal and transformation processes in the Constructed Wetland System.	Water Environment Research (Under Journal Revision), 2021.	Malyan, Sandeep K; Yadav, Shweta; Sonkar, Vikas; Goyal, VC; Singh, Omkar; Singh, Rajesh
		Circular Economy Opportunity through Pond Restoration and Management: A New Sustainability Paradigm for India	Science of Total Environment. (Under Review), 2021	Shweta Yadav; V.C. Goyal
		IIT Bombay		
		Review of Circular Economy in urban water sector: Challenges and opportunities in India	Journal of Environmental Management, 2020, 271, 111010 https://doi.org/10.1016/j.jenvman.2020.111010	Nikita S. Kakwani, Pradip P. Kalbar
		Hybrid treatment systems: a paradigm shift to achieve sustainable wastewater treatment and recycling in India	Clean Technologies and Environmental Policy, 2021, https://doi.org/10.1007/s10098-021-02034-x	Pradip P. Kalbar

		MNIT Jaipur			
		Nitrogen transformation processes and mass balance in deep constructed wetlands treating sewage, exploring the anammox contribution	Bioresource Technology, 314, 2021, pp-123737	Aakanksha Rampuria, Akhilendra Bhushan, Urmila Brighu	
		Novel microbial nitrogen transformation processes in constructed wetlands treating municipal sewage: a mini-review	World Journal of Microbiology and Biotechnology, 37(3), pp.1-11.2021	A Rampuria, NM Kulshreshth, AB Gupta, U Brighu	
		Microbiological analysis of two deep constructed wetlands with special emphasis on the removal of pathogens and antibiotic resistant bacteria	Water, Air, & Soil Pollution (Under Review)	A Rampuria, NM Kulshreshtha, AB Gupta, U Brighu	
		IRMA Anand			
		NIL			
20.	Presentations in Symposia/ Conferences during the period	MNIT Jaipur			
		Title of the Talk/paper	Symposium/ Conference	Dates of the Symp/Conf.	Presenter /Authors
		Improving the treatment capacity of existing constructed wetlands by realizing their full potential	International Conference on Biotechnology for Sustainable Agriculture, Environment and Health	April 4-8, 2021	A Soti, V Verma, AB Gupta, NM Kulshreshtha, U Brighu
		Strategies for enhancing phosphorous removal in Constructed Wetlands	Advances in Chemical, Biological and Environmental Engineering (ICACBEE-2021)	23th -24th April, 2021	A. Soti, V. Verma1, A. B. Gupta, N. M. Kulshreshtha, A. Rampuria, U. Brighu
21.	Patents Filed during the period:	NIL			
22.	Is the Acknowledgement for DST including grant reference mentioned in all publications/patents etc	Yes			
23.	Give Details of Any Awareness Program/Workshop/Seminar/Webinar, Knowledge Strengthening Programme or Awareness Camps	NIH Roorkee Inception Cum Need Assessment Workshop (8-9 August, 2019) conducted by NIH, Roorkee. <ul style="list-style-type: none"> The two-day workshop on Inception cum Need Assessment Workshop convened on 8-9 August 2019 at National Institute of Hydrology (NIH), Roorkee. A total of 50 participants from 17 organisations took part in the workshop, including two representatives from the Department of Science and Technology (DST). Stakeholders with a range of experience and expertise participated from all the 			

levels (i.e., administrative authorities, research institutes, universities, water utilities, NGOs, and Gram Panchayat).

- Workshop Report Link- http://117.252.14.242/rmod_dst/downloads.aspx



Press release of the Workshop at NIH Roorkee (8-9 August, 2019)

- Dr V C Goyal delivered a lecture on ‘Water Security Through Resilient Water Bodies’ during training course on ‘Water security for resilience to deal with disasters and outbreaks’, 2-6 Nov 2020.

IIT Bombay

- Prof. Pradip Kalbar delivered a lecture in Master Class Webinar Series: Smart Water Reclamation & Reuse - Experiences from India & USA webinar on "Enabling Wastewater Reuse Using Circular Economy: Challenges and opportunities" on Jan 12, 2021

MNIT Jaipur

- Training program on the operation and management of STPs has been organized for LSG officials from 22nd to 25th March, 2021, which includes a complete session on constructed wetlands.
- A lecture was delivered by Dr A. B. Gupta in an Environmental awareness webinar on February 1, 2021 by Samagram (an NGO) of Udaipur on World Wetland Day

IRMA Anand

- NIL

24. Any Other Achievements/ Comments

IIT Bombay

- Prof. Pradip Kalbar delivered a lecture in Master Class Webinar Series: Smart Water Reclamation & Reuse - Experiences from India & USA webinar on "Enabling Wastewater Reuse Using Circular Economy: Challenges and opportunities" on Jan 12, 2021.

25. Financial and Manpower Status

NIH Roorkee

Amount Sanctioned (Five year)	Amount Received	Manpower Sanctioned	Manpower in position
270,18,828	143,97,228	3	3

IIT Bombay

Amount Sanctioned (Five year)	Amount Received	Manpower Sanctioned	Manpower in position
82,95,440	21,90,640	2	2

		MNIT Jaipur			
		Amount Sanctioned (Five year)	Amount Received	Manpower Sanctioned	Manpower in position
		86,02,030	25,40,430	2	2
		IRMA, Anand			
		Amount Sanctioned (Five year)	Amount Received	Manpower Sanctioned	Manpower in position
		71,02,480	16,40,880	2	2
26.	Action taken on the observation of the Project Review Committee in its preceding Meeting	Review Meeting held on...N.A.			
		Observation		Action Taken	
27.	Status of Shortfalls of all the preceding Reviews				

Signature of the PI :



Name of the PI : Dr V C Goyal

Place : Roorkee

Date : 25 March 2021