Africa online TOT - on Groundwater recharge and mapping of aquifers and managing sanitation in rural areas

October 16-31, 2024

2024-2025

Centre for Science and Environment (CSE), New Delhi, India

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Africa online TOT - on Groundwater recharge and mapping of aquifers and managing sanitation in rural areas

Dates: October 16-31, 2024

Training Duration: Two weeks

Learning Platforms: Moodle and zoom for live session

Training Type: Online

Background: Groundwater is a primary source of drinking water and the invisible part of the hydrological cycle. An estimated 75 percent of the African population relies on groundwater for their drinking water. In rural regions, the infrastructure is limited and access to reliable water source is unapproachable due to different hydrogeological regions.

Countries like Tanzania, Uganda and Nigeria have over 70 percent population residing in rural areas where drinking water is primarily obtained from groundwater. But there is not enough safely regulated drinking water in the nations despite enough rainfall. The unplanned urbanization and seasonal and annual variations in rainfall have reduced the natural recharging of groundwater. Even there is an increased groundwater contamination due to natural and man-made reasons.

To conserve water sources, the safe sanitation practices are often compromised. In rural areas of Tanzania, only 24 percent of people have access to basic sanitary services that contaminates the groundwater with nation experiencing frequent outbreaks of water-borne illnesses and losing over $206 million a year in economic losses said World Bank report of 2021. Similar circumstances are seen in Uganda, where pit toilets—mostly the traditional kind—remain the preferred sanitation option. Emptying and securely disposing of waste is a big challenge. In 2012, World Bank reported that this has further left Uganda losing UGX 389 billion, or $177 million with 8 lakh deaths in children under five due to diarrhea. Nigeria the highest number of people defecating in the open. The undigested fecal sludge from mostly pit toilets in the rural areas are either buried or dumped in the open resulting in the contamination the soil and water. This unimproved sanitation practices have costed the nation over 455 billion Nigerian Naira annually as per the World Bank report of 2012.

Centre for Science and Environment, New Delhi had been carrying out several courses on groundwater management and safe management of faecal sludge in rural areas for the government officials of the partner countries. This online TOT course is designed for the government officials of the partner countries who are responsible for training the local government and the communities. The course will provide a comprehensive overview on managing the aquifers, drinking water source sustainability, linking the groundwater sources to safe management of faecal sludge, best policies and regulations existing in Global South in these areas.

Aim: The course gives guidance and train the practitioners and regulators on rural groundwater and sanitation to help them identify the region-specific challenges and develop a roadmap to reach a sustainable and safe groundwater reserve and sanitation practices.

Training Agenda

Course Structure

Material will be released weekly on the course platform for the participants, and the pass mark stands at 50%

Course Module Structure

Modules 1 and 2 (Week 1)– Hydrogeological typologies and Groundwater estimation methodologies (7 Days, October 17 – October 23, 2024) **Total Hours - 8 Hours** **4 hrs on Moodle + 4 hrs Interactive sessions**	
Key Themes & Sub Themes	**Learning and Interaction Methods**
MODULE 1 **1.1 Introduction to hydrogeology and its typologies** • Identifying the aquifers, its extent, transmissivity and storavity • Types of aquifers, Effluent and influent aquifers; defining groundwater tables, piezometric heads, groundwater flow patterns	• Essential Reading Material • Presentations • Action Learning - DTE Articles, Video Documentaries Threads on Discussion forums – Introduction and announcements **Introductory Session (1 hr):** Training overview, Moodle introduction *Day 1, October 16, 2024* **Interactive Session 1 (1 hr):** State of groundwater and sanitation in rural areas of Global South: interconnection between groundwater and sanitation: *Ms. Sushmita Sengupta, CSE* *October 18, 2024* **Interactive Session 2 (1 hr):** Understanding of the hydrology, soil, physiography of a terrain to map groundwater extraction and recharge zones and identifying data sources and analyzing the data: *Mr. Pradeep Mishra, CSE* *October 20, 2024* **Interactive Session 3 (1 hr):** Use of GIS tools to map the potential recharge zones: *Mr. Vivek Kumar Sah, CSE* *October 22, 2024*
1.2 Groundwater estimation methodologies • Techniques and methodologies to estimate groundwater and its recharge: flow measurement and Darcy law, hydraulic conductivity • Groundwater monitoring: water level fluctuations and its monitoring using piezometers	
MODULE 2 **2.1 Mapping the aquifers** • Climate variability and water stress in Global South • Health cost burden due to water crisis • How countries can find solution through management of groundwater/aquifers: Case studies from Global South • How to map a local aquifer – tools and techniques • Understanding the role of GIS in planning and management of groundwater • Mapping the potential recharge and discharge areas • Different techniques to recharge groundwater in different geological regions	
2.2 Legal framework in groundwater • Legal frameworks and policies/funds governing groundwater management in global South • Role of different stakeholders in management of groundwater • Case studies on groundwater management	

Modules 3 and 4 (Week) 2 – Safe onsite treatment of faecal sludge, reuse and safe disposal (7 days, October 24 – October 31, 2024) **Total Hours - 8 Hours** **2 hrs on Moodle + 6 hrs Interactive sessions**	
MODULE 3 **3.0 Overview of fundamentals for design and selection of treatment technologies in rural sanitation** • Challenges in managing the faecal sludge in rural areas of Global South • Policies and legal framework governing the faecal sludge management in Global South • Design of different types of toilets in different ecological regions	• Essential reading Material • Presentations • Action Learning - DTE Articles Video Documentaries Threads on Discussion forums – Reflections and conceptual clarifications **Interactive Session 4 (1 hr):** Different types of on-site sanitation systems: Special focus to honeycomb & IEC: *Ms. Swati Bhatia, CSE* *October 24, 2024*
MODULE 4 **4.0 Current status and management practices in rural sanitation** • Best practices on different types of toilets from rural areas of Global South • Managing greywater at institutional levels • Case studies from Global South	**Interactive Session 5 (1 hr):** Institution wastewater management and reuse: *Ms. Mehak Puri, CSE* *October 26, 2024* **Interactive Session 6 (2 hr):** Discussion on country specific problems regarding groundwater recharge: CSE Team *October 28, 2024* **Interactive Session 7 (2 hr):** Discussion on country specific problems regarding sanitation: CSE Team *October 30, 2024*

Africa online TOT – "Groundwater recharge and mapping of aquifers and managing sanitation in rural areas"

October 16-31, 2024

Virtual Session Agenda

Time	Topics	Speaker
Wednesday, October 16, 2024		
1:00-1:30 pm EAT	Welcome Session	CSE Team
1:30-1:45 pm EAT	Session Briefing	CSE Team
1:45-2:00 pm EAT	Q&A	
Friday, October 18, 2024		
1:00-1:15 pm EAT	Session Briefing	
1:15-1:45 pm EAT	Topic – State of groundwater and sanitation in rural areas of Uganda, Tanzania, and Nigeria	Sushmita Sengupta, CSE
1:45-2:00 pm EAT	Q&A 15 minutes would be spent on questions and doubt through the self-study modules.	
Sunday, October 20, 2024		
1:00-1:15 pm EAT	Session Briefing	CSE Team
1:15-1:45 pm EAT	Topic – Understanding of the hydrology, soil, physiography of a terrain to map groundwater extraction and recharge zones • Identifying data sources and analyzing the data	Pradeep Mishra, CSE
1:45-2:00 pm EAT	Q&A 15 minutes would be spent on questions and doubt through the self-study modules.	
Tuesday, October 22, 2024		
1:00-1:15 pm EAT	Session Briefing	CSE Team
1:15-1:45 pm EAT	Topic – Using GIS tools to map the potential recharge zones	Vivek Kumar Sah, CSE
1:45-2:00 pm EAT	Q&A	

	15 minutes would be spent on questions and doubt through the self-study modules.	
Thursday, October 24, 2024		
1:00-1:15 pm EAT	Session Briefing	CSE Team
1:15-1:45 pm EAT	Topic- Different types of on-site sanitation systems: Special focus to honeycomb & IEC	Swati Bhatia, CSE
1:45-2:00 pm EAT	Q&A 15 minutes would be spent on questions and doubt through the self-study modules.	
Saturday, October 26, 2024		
1:00-1:15 pm EAT	Session Briefing	CSE Team
1:15-1:45 pm EAT	Topic- Institution wastewater management and reuse	Mehak Puri, CSE
1:45-2:00 pm EAT	Q&A 15 minutes would be spent on questions and doubt through the self-study modules.	
Monday, October 28, 2024		
1:00-1:15 pm EAT	Session Briefing	CSE Team
1:15-2:30 pm EAT	Topic- Discussion on country specific problems regarding groundwater recharge	CSE Team
2:30-3:00 pm EAT	Q&A 15 minutes would be spent on questions and doubt through the self-study modules.	
Wednesday, October 30, 2024		
1:00-1:15 pm EAT	Session Briefing	CSE Team
1:15-2:30 pm EAT	Topic- Discussion on country specific problems regarding sanitation	CSE Team
2:30-3:00 pm EAT	Q&A 15 minutes would be spent on questions and doubt through the self-study modules.	
3:00-3:05 pm EAT	Vote of Thanks	CSE Team

Number of registered participants- 85

Number of participants who attended the training- 64

Proceedings of the training

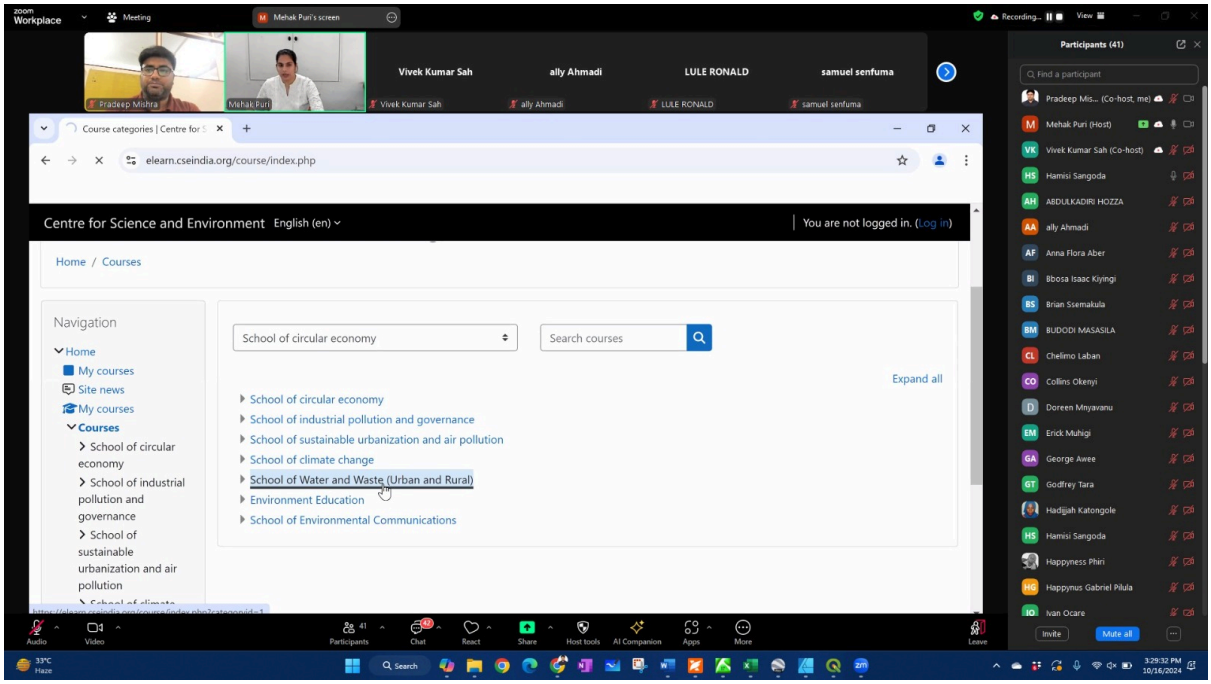
The two-week Africa TOT online training was on the topic “Groundwater recharge and mapping of aquifers and managing sanitation in rural areas”. The course gave guidance and trained the practitioners and regulators on rural groundwater and sanitation to help them identify the region-specific challenges and develop a roadmap to reach a sustainable and safe groundwater reserve and sanitation practices.

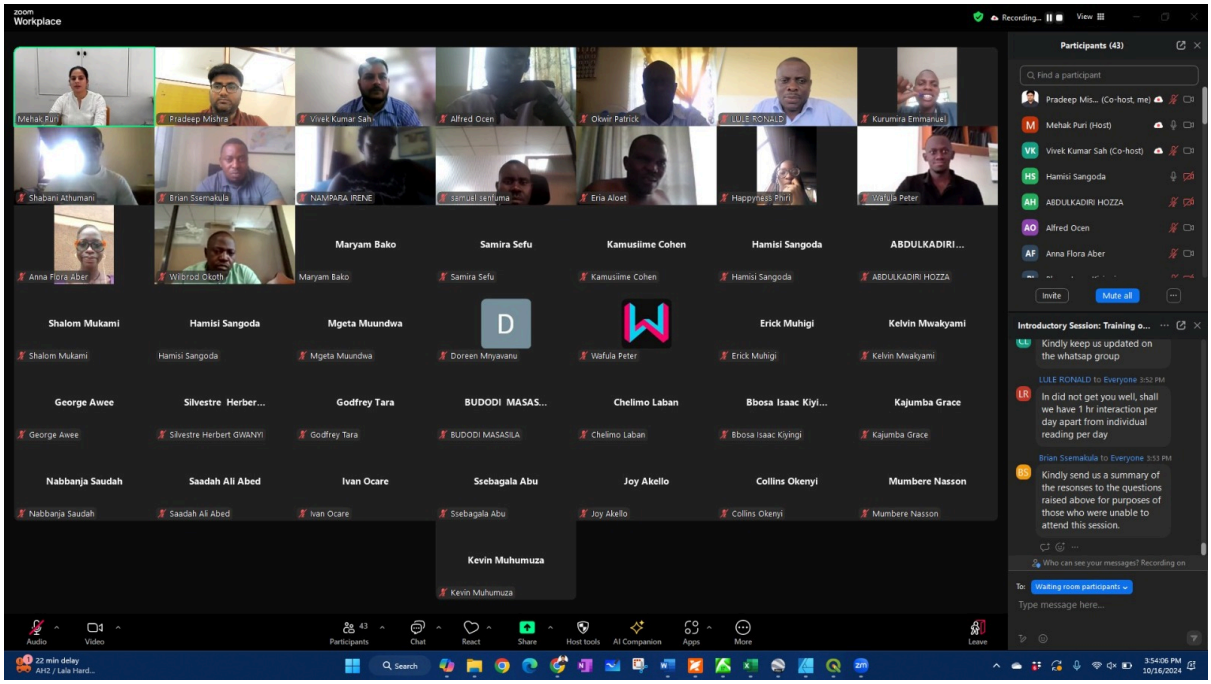
The participants also got an understanding of the science and practical elements of groundwater, aquifer management, and safe sanitation practices through various case studies and expert interactions.

The course was completely online for a period of 15 days requiring 1 hour of involvement in a day. The course was completed by giving an assignment to the participants with online course certification.

Live session 1:

First live session was taken up the course coordinator Ms. Mehak Puri, CSE regarding the introduction to the online platform “Moodle”. An overview of the course was discussed and also the participants were shown a demo to how to use their login credentials to login to the moodle and access the course.

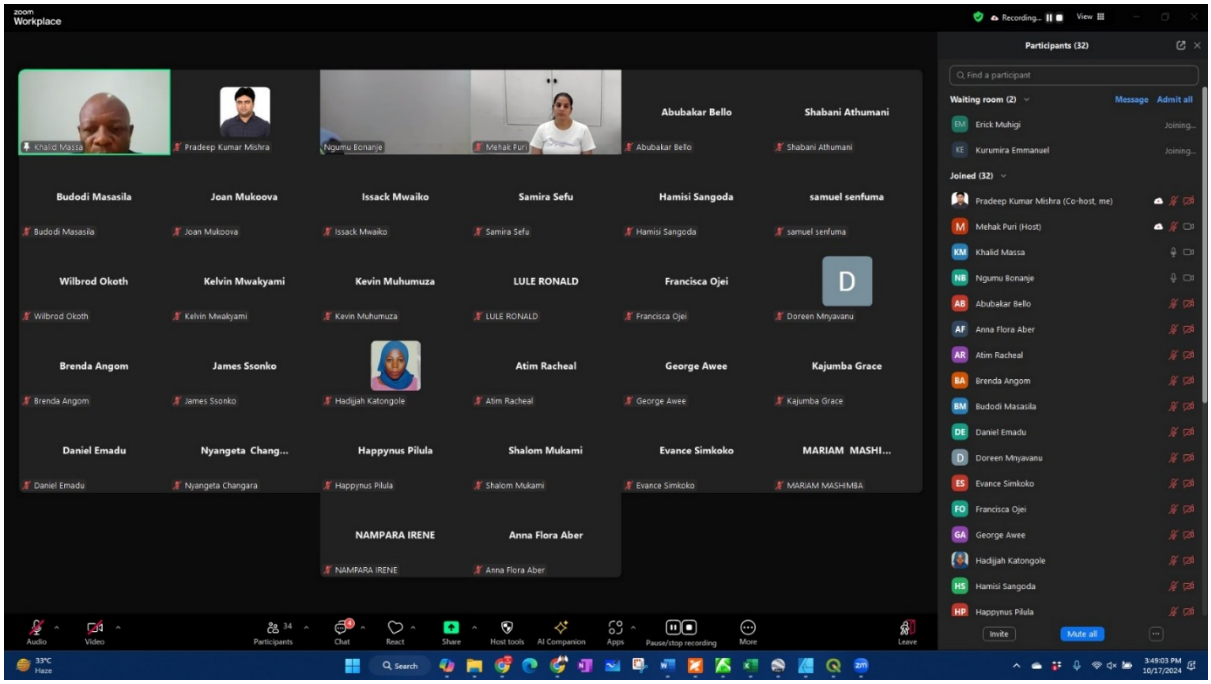


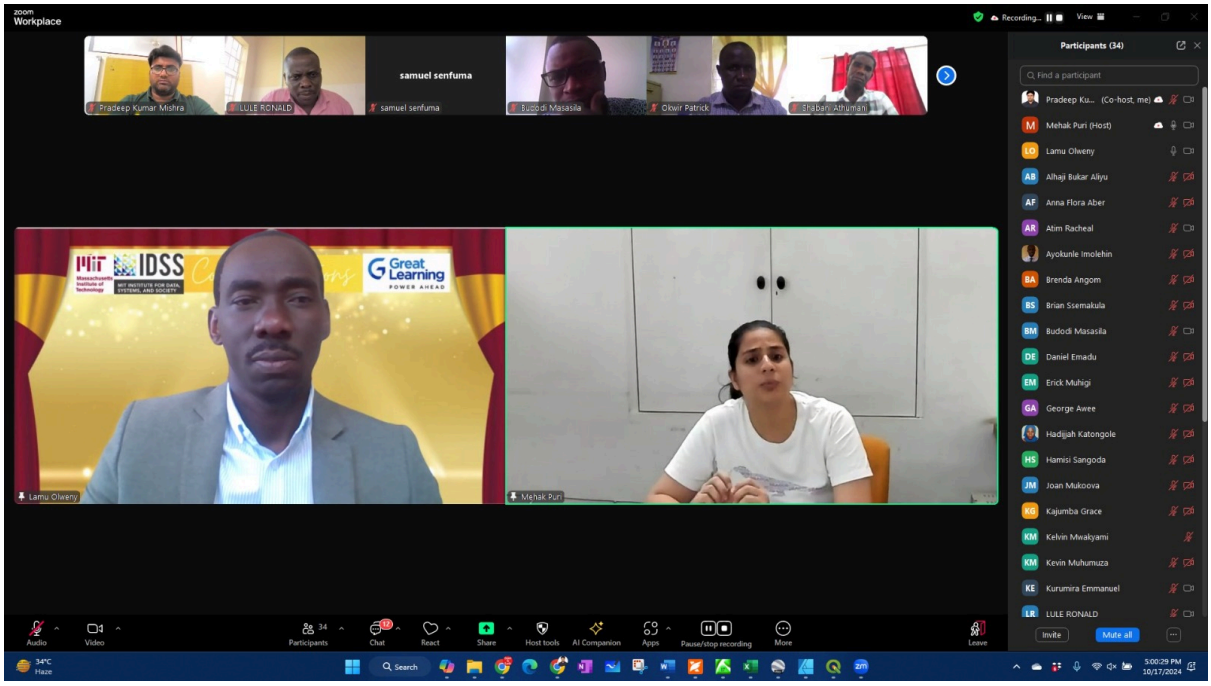


Live session 2:

The second live session was on the topic “Overview on CSE's-Ministry of Health and Social Welfare, Tanzania Partnership and Training” by Dr. Khalid Massa, Assistant Director, Environmental Health and Sanitation Section, Ministry of Health, Tanzania. He briefed about the CSE's and Ministry of Health and Social Welfare, Tanzania's partnership and also laid stress on how this online training can help the participants to broaden their concepts and approach in groundwater and sanitation.

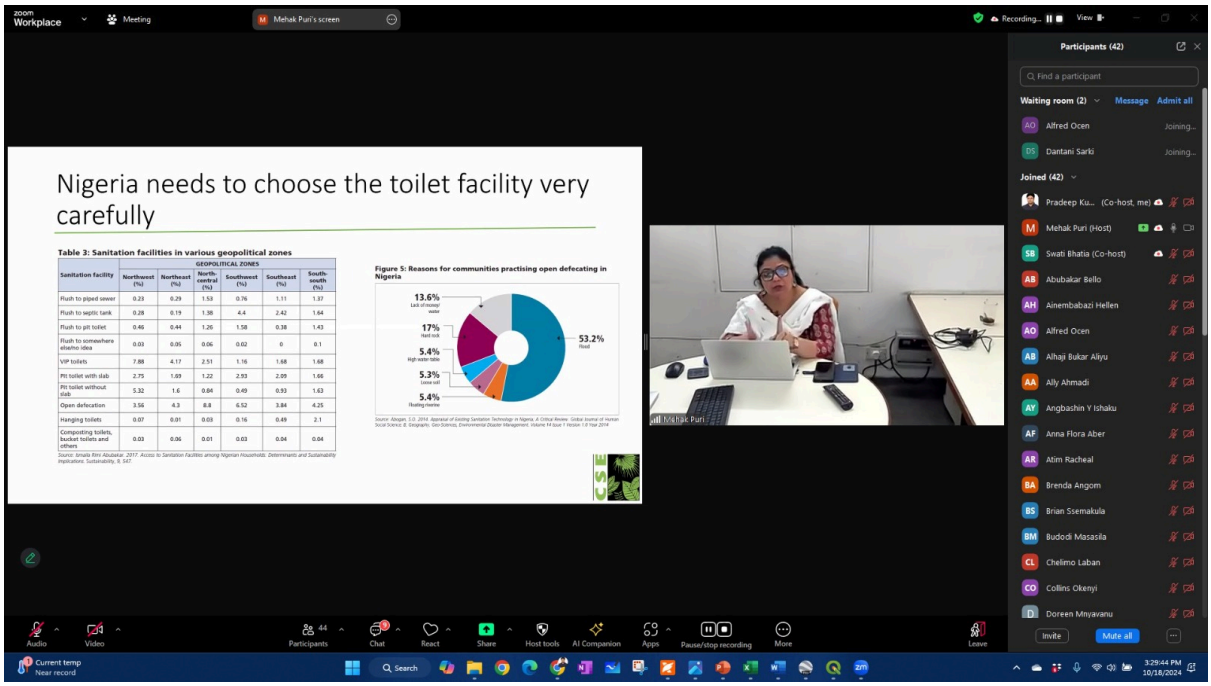
The session was further followed by another topic of discussion on “Overview on CSE's-Ministry of Water and Environment, Uganda: Partnership and Training”. Engineer Lamu, Assistant Commissioner - Research and Development at the Ministry of Water and Environment, Uganda explained about the CSE's and Ministry of Water and Environment, Uganda, partnership and also highlighted the participants the take away points from the online training.

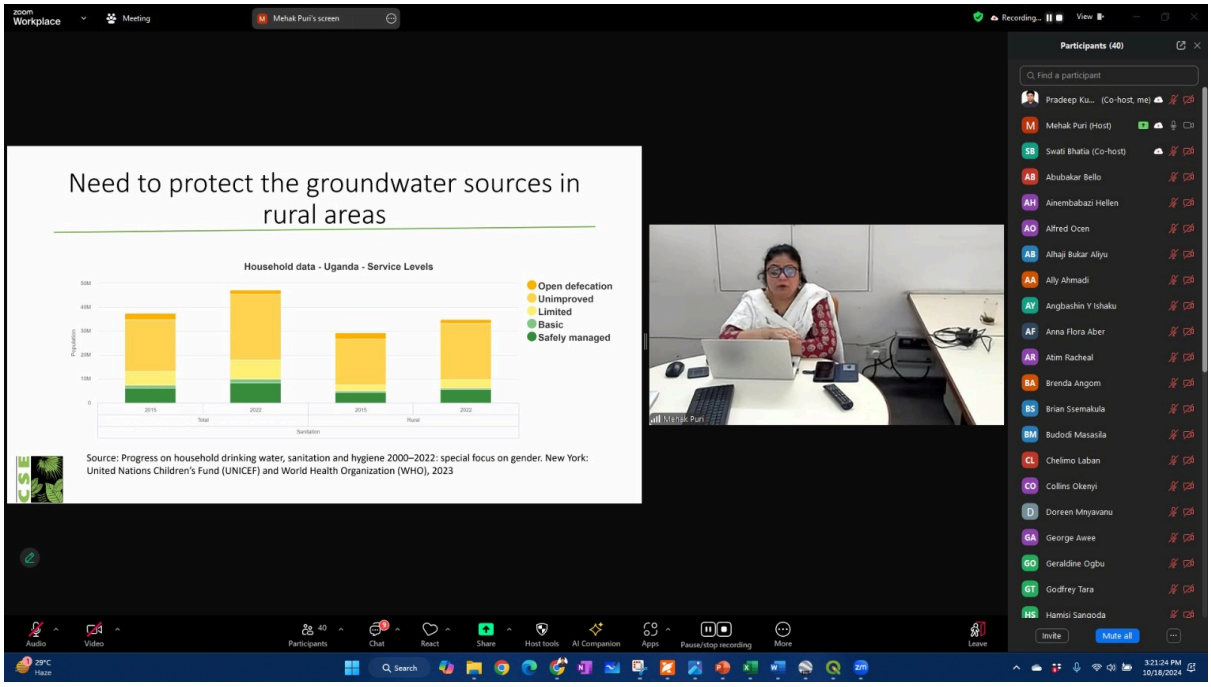

zoom Workplace
Participants (32)
Waiting room (2)
Joined (32)
Khalid Massa
Pradeep Kumar Mishra
Ngumu Bonanje
Mehak Puri
Abubakar Bello
Shabani Athumani
Budodi Masasila
Joan Mukoova
Issack Mwaiko
Samira Sefu
Hamisi Sangoda
samuel senfuma
Wilbrod Okoth
Kelvin Mwakyami
Kevin Muhumuza
LULE RONALD
Francisca Ojei
Doreen Mnyavanu
Brenda Angom
James Ssonko
Hadijah Katongole
Atim Racheal
George Awee
Kajumba Grace
Daniel Emadu
Nyangeta Chang...
Happynus Pilula
Shalom Mukami
Evance Simkoko
MARIAM MASHI...
NAMPARA IRENE
Anna Flora Aber
Audio
Video
Participants
Chat
React
Share
Host tools
AI Companion
Apps
Pause/stop recording
More
Leave


zoom Workplace
Participants (34)
samuel senfuma
Pradeep Kumar Mishra
LULE RONALD
Budodi Masasila
Okwir Patrick
Shabani Athumani
Lamu Olweny
Mehak Puri
Audio
Video
Participants
Chat
React
Share
Host tools
AI Companion
Apps
Pause/stop recording
More
Leave

Live session 3:

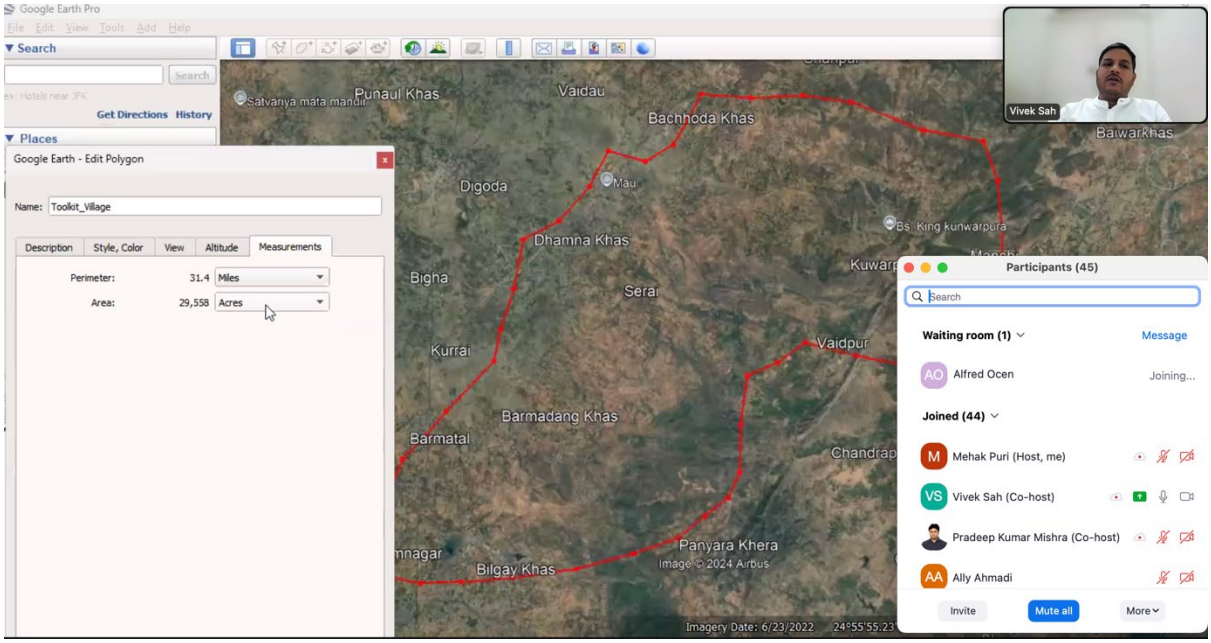
The third live session was conducted by Ms. Sushmita Sengupta, CSE on the topic “State of groundwater and sanitation in rural areas of Uganda, Tanzania, and Nigeria”. The session highlighted the current state of groundwater and sanitation in the countries. The session also discussed the critical way forwards that can be adopted to improve the conditions in the respective countries.

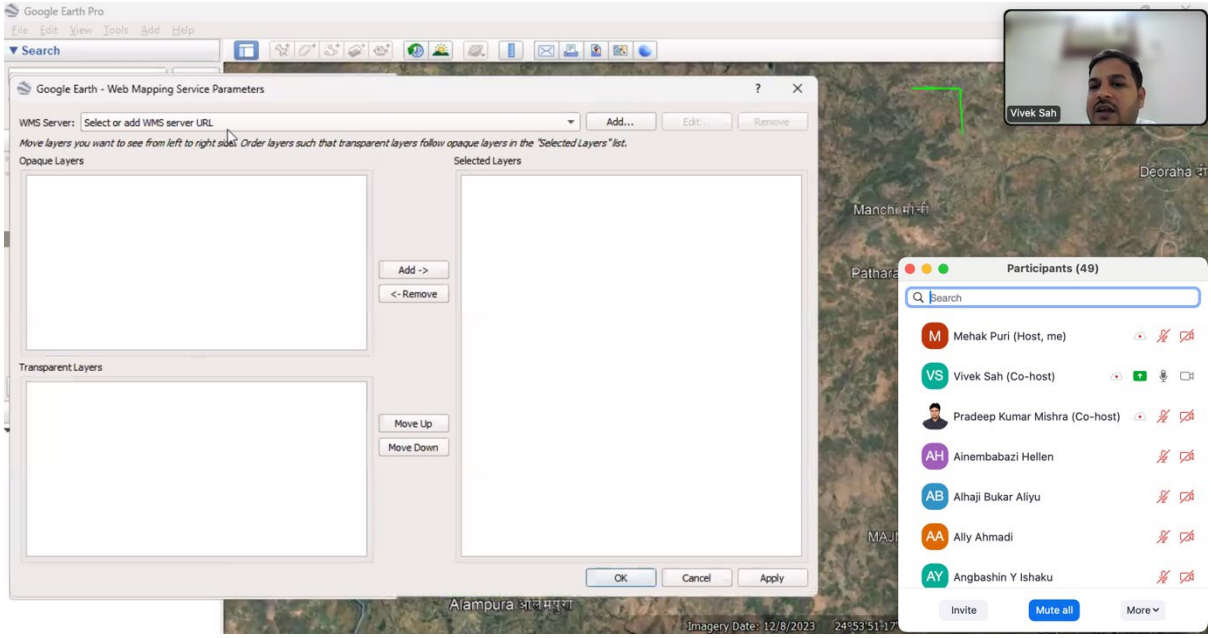




Live session 4:

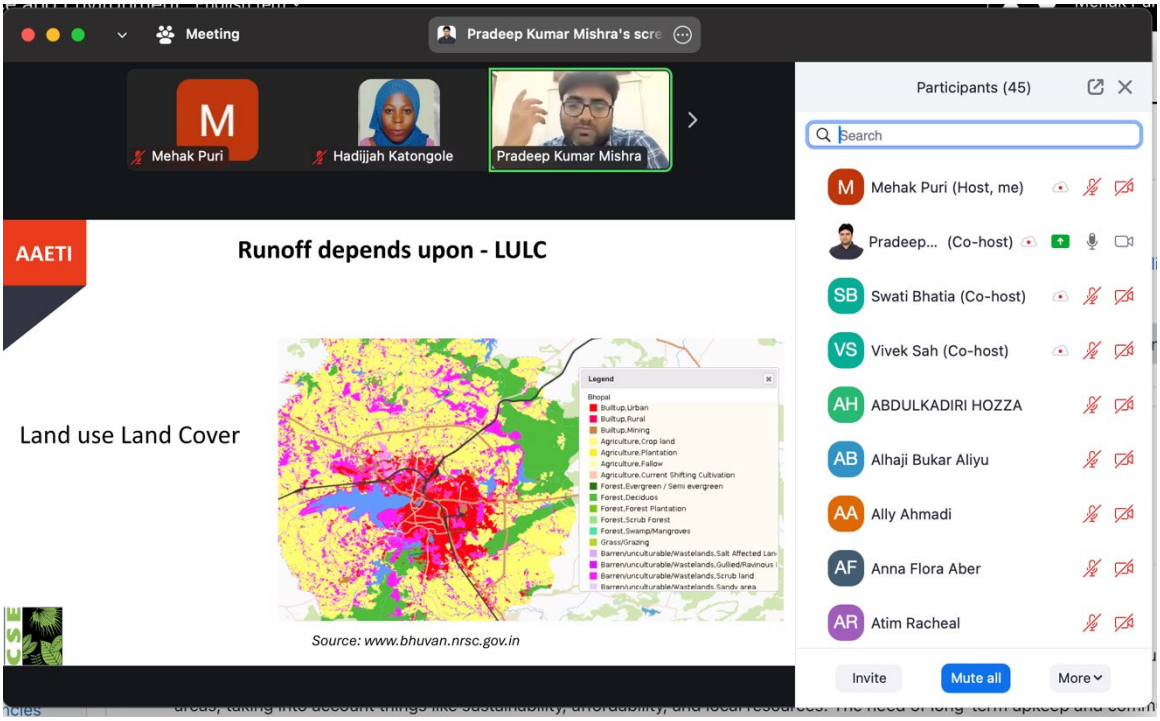
The fourth live session was conducted by Mr. Vivek Sah, CSE on the topic “Using GIS tools to map the potential recharge zones”. Mr. Vivek highlighted the concepts of GIS and remote sensing and its significance in planning the potential recharge zones.

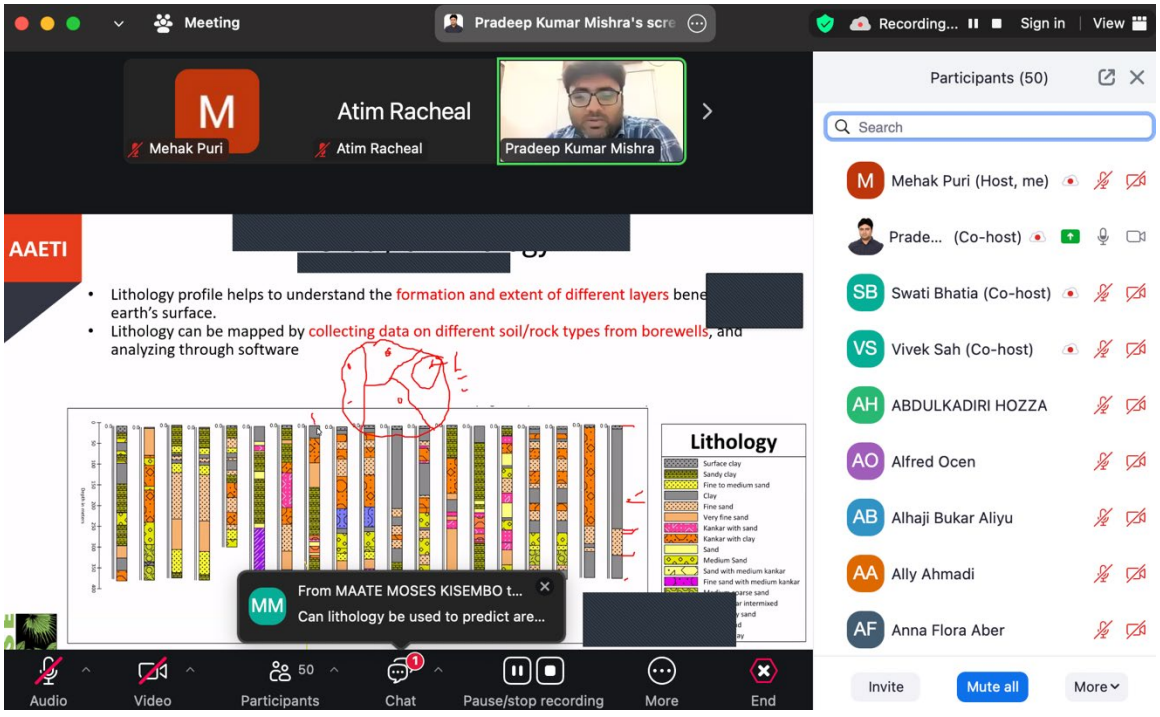




Live session 5:

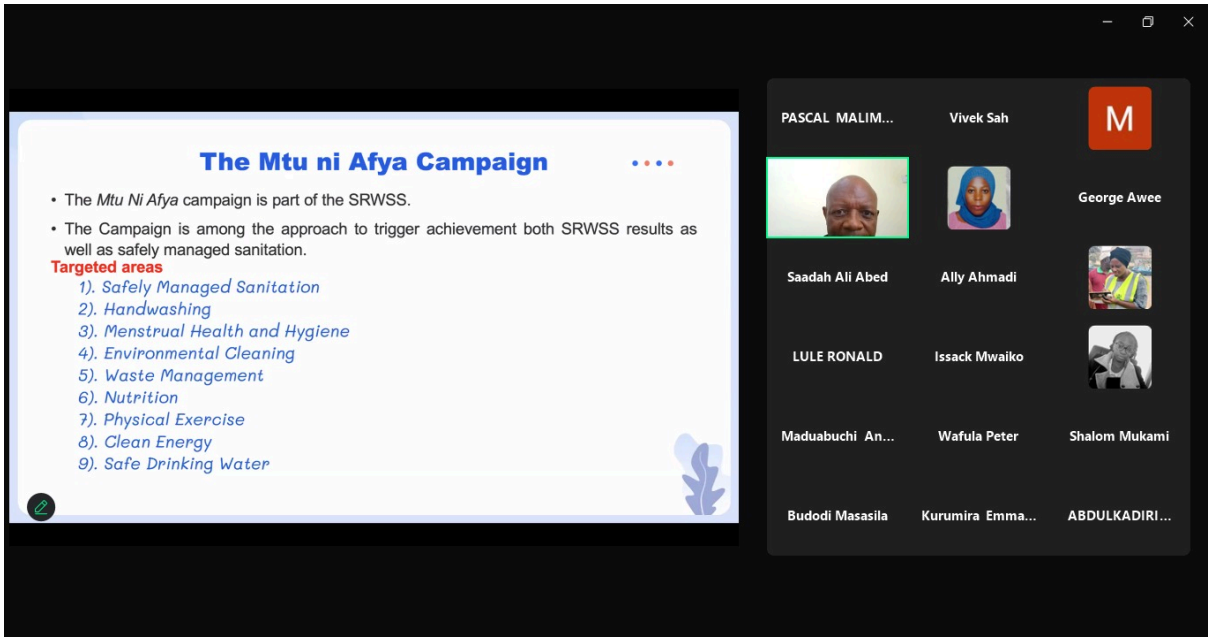
The fifth live session was conducted by Mr. Pradeep Kumar, CSE on the topic "Understanding of the hydrology, soil, physiography of a terrain to map groundwater extraction and recharge zones and identifying data sources and analysing the data". Mr. Pradeep discussed the key points while considering the mapping and planning of the potential groundwater recharge zones. He also highlighted on identifying the data sources and also analysing them to resourcefully consider for groundwater extraction.





Live session 6:

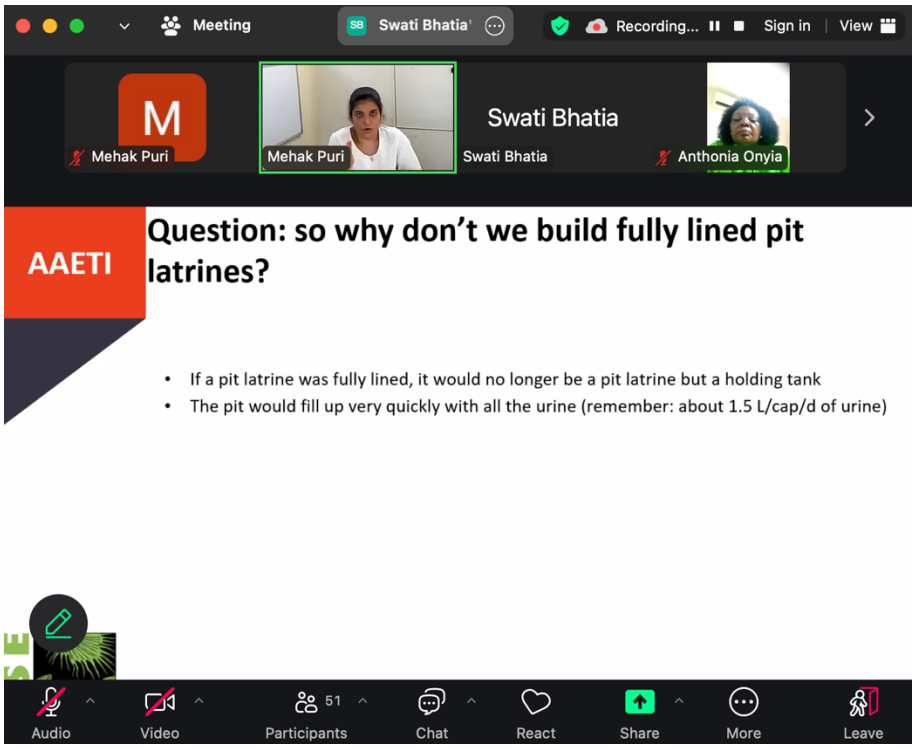
The sixth live session was conducted by Dr. Khalid Massa, Assistant Director, Environmental Health and Sanitation Section, Ministry of Health, Tanzania on the topic “How rural Tanzania will move towards safe water and sanitation”. Dr. Massa highlighted the initiatives and steps that are being taken up by Tanzania to move towards safe sanitation and also working on the groundwater recharge levels.

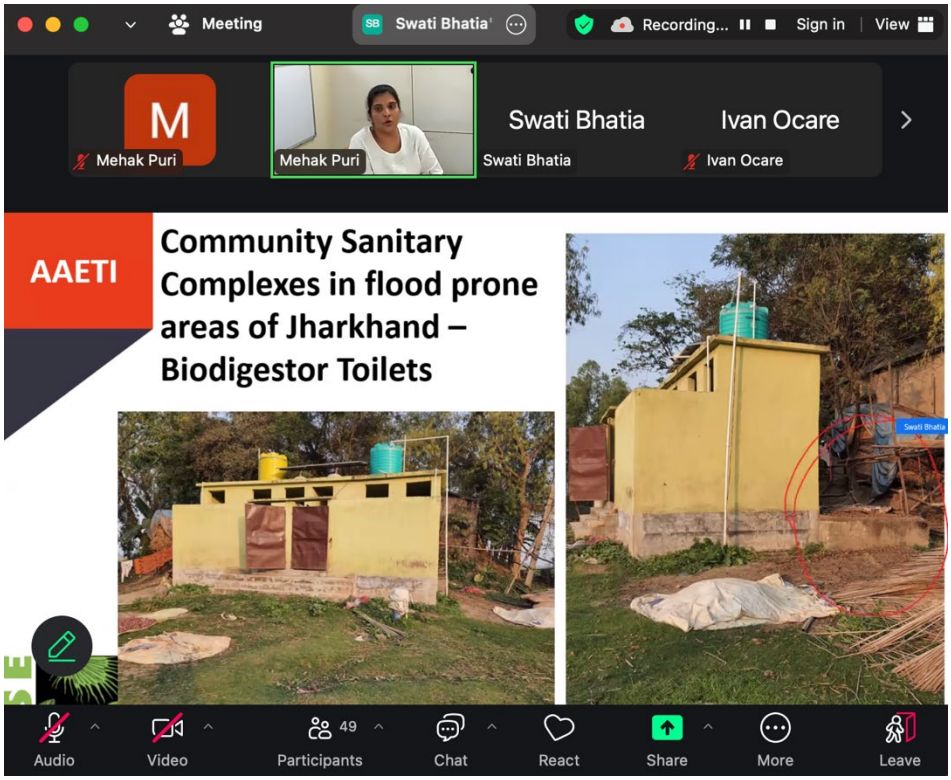


Live session 7:

The seventh live session began with “Discussing country specific issue on groundwater” by CSE team. The session discussed the issues on water, critical factors to consider while mapping or identifying the recharge zones. The session also briefed on the methods to recharge groundwater such as rainwater harvesting. Overall, the session underlined the significance and methodologies to groundwater recharge.

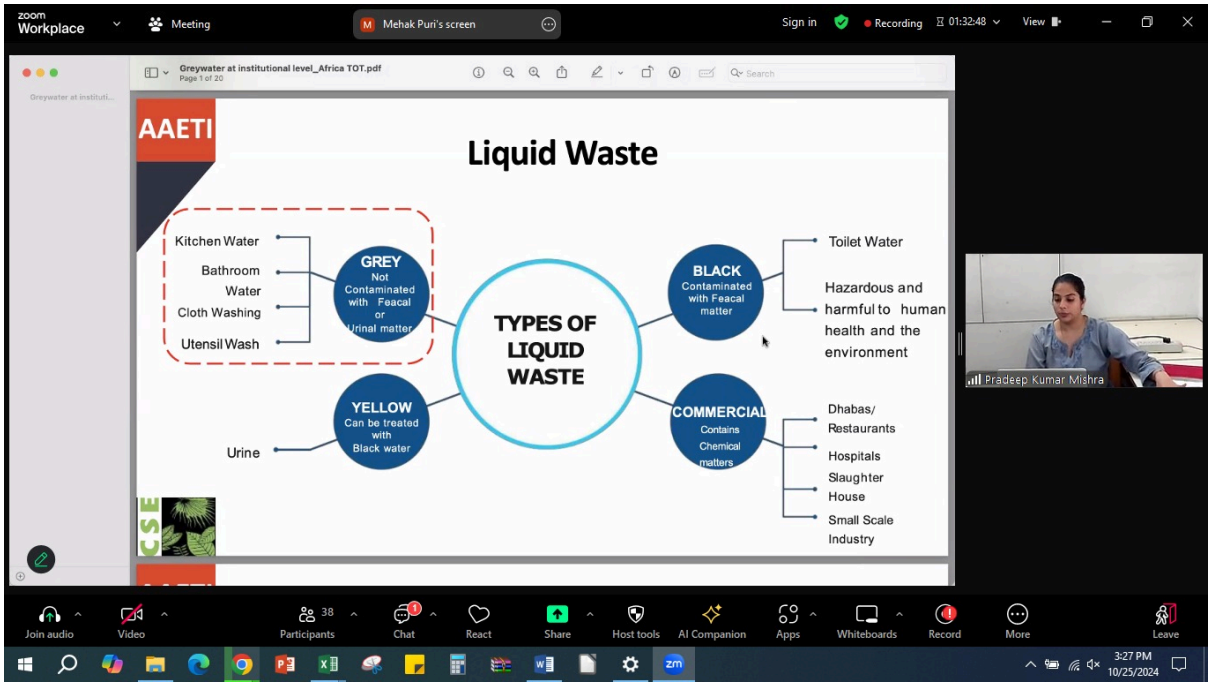
Another live session was conducted by Ms. Swati Bhatia, CSE on the topic "Different types of on-site sanitation systems: Special focus to honeycomb & IEC". Ms. Swati explained the different on-site sanitation systems, its design and key considerations during the implementation of sanitation systems in rural areas. She also shared the case examples from India under different typological conditions and different water levels. She further laid the stress on the significance of information, education and communication (IEC) in successful implementation and regulation and monitoring of the sanitation systems in rural areas.

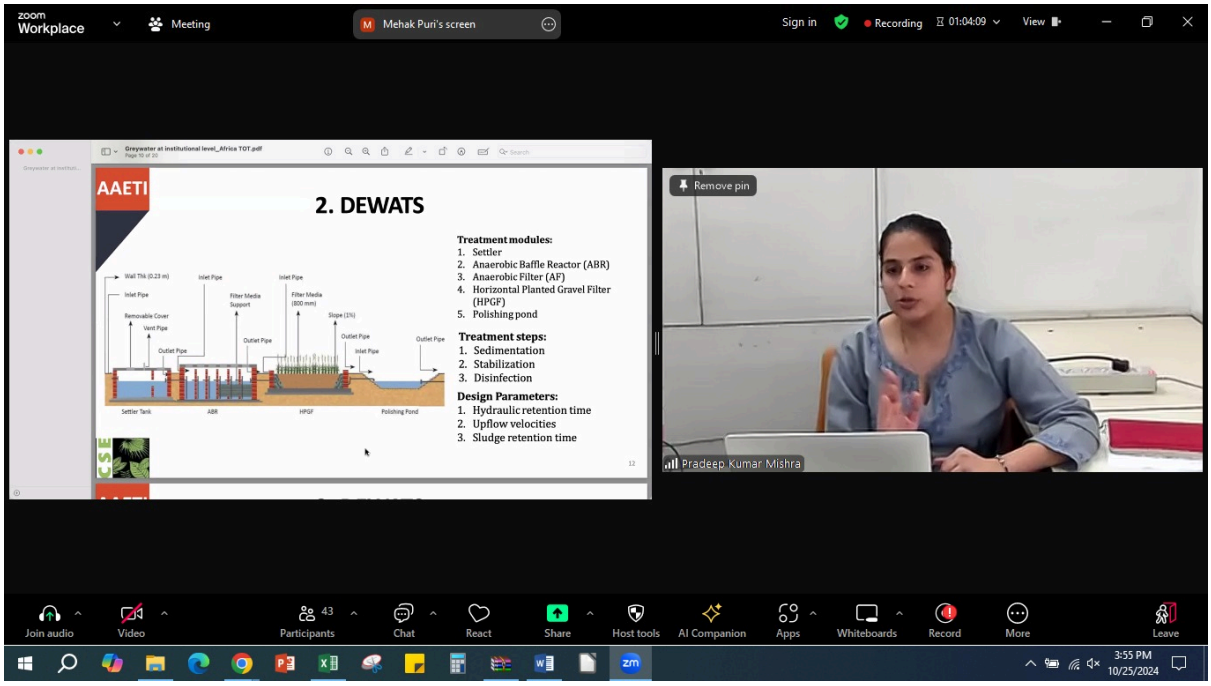




Live session 8:

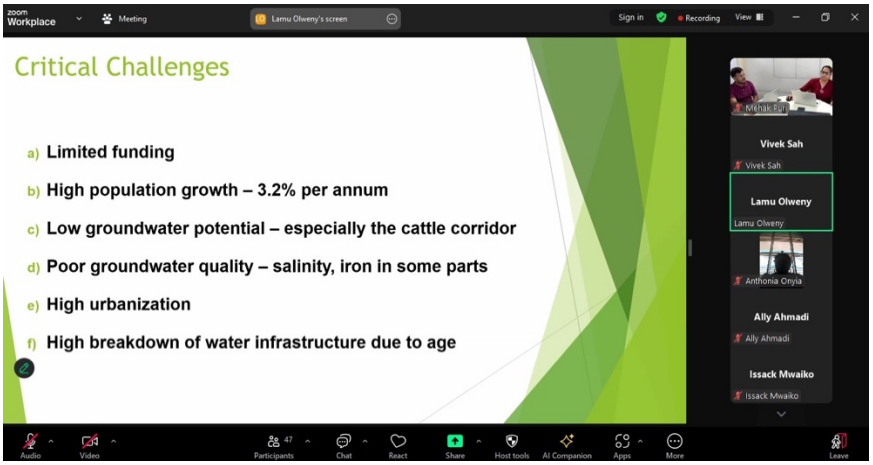
Eighth live session was taken by Ms. Mehak Puri, CSE on the topic “Greywater Management at Institutional level”. She discussed the definition of greywater and its quantification at institutional level. She also explained different nature-based technologies that can be adopted at the institutional level to treat greywater.

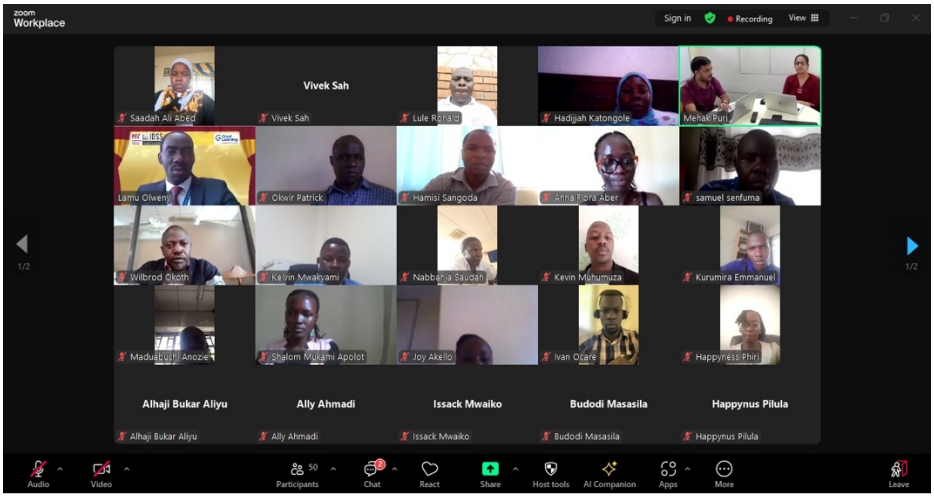




Live session 9:

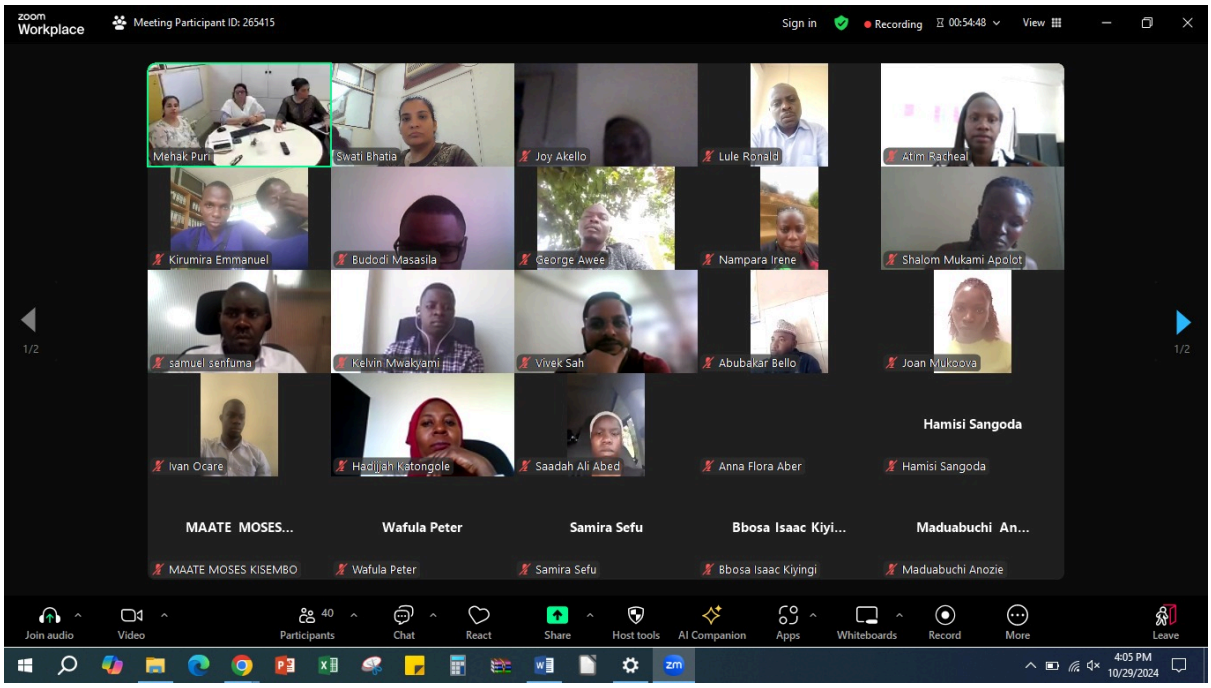
The ninth session was another topic of discussion on “What Uganda is planning for better management for rural water and sanitation” by Engineer Lamu, Assistant Commissioner - Research and Development at the Ministry of Water and Environment, Uganda. He stated important proposed strategic points they wish to implement in next five years in their country in water and sanitation sector. Further, he also highlighted their focus on sustainability and gradual shifting from point water sources to piped water system.

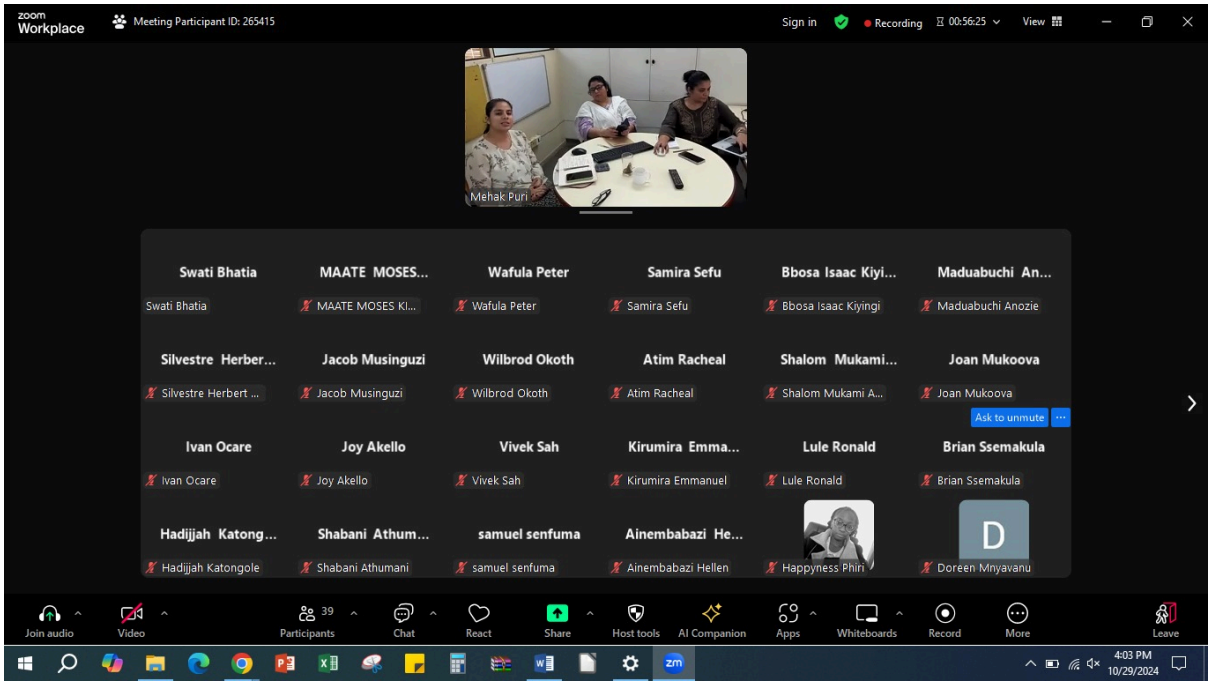




Live session 10:

The tenth session was on “Country specific issue on sanitation” by CSE team. The session discussed on various sanitation issues in the respective African countries. Possible solutions to the queries were also discussed. The team also discussed on water quality and emphasised the importance of IEC among the people in rural areas for successful implementation of technologies.

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Sign in
Recording
00:56:25
View
Mehak Puri
Swati Bhatia
MAATE MOSES...
Wafula Peter
Samira Sefu
Bbosa Isaac Kiyi...
Maduabuchi An...
Silvestre Herber...
Jacob Musinguzi
Wilbrod Okoth
Atim Racheal
Shalom Mukami...
Joan Mukoova
Ask to unmute
Ivan Ocare
Joy Akello
Vivek Sah
Kirumira Emma...
Lule Ronald
Brian Ssemakula
Hadijjah Katong...
Shabani Athum...
samuel senfuma
Ainembabazi He...
Happyness Phiri
Doreen Mnyavanu
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