

International Training Programme

Mainstreaming Sustainable Urban Water Management

23-24 March, 2015 – Urban Rainwater Harvesting

25-26 March, 2015 – Decentralised Wastewater Treatment and Reuse



Organised by

Centre for Science and Environment
New Delhi, India



In partnership with local host

Lanka Rainwater Harvesting Forum
Colombo, Sri Lanka

Duration	March 23 to 26, 2015
Venue	The Sovereign Hotel, Colombo, Sri Lanka
Accommodation	The Sovereign Hotel, No 100C, Road to Capital City, Rajagiriya, Sri Lanka + 94 11288 35 41/43 http://www.thesovereignhotel.com reservations@thesovereignhotel.com
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About Centre for Science & Environment (CSE)

The Centre for Science and Environment (CSE) is an independent public interest research organization that aims to promote an informed public opinion in favor of environmental sustainability and sustainable development. The CSE started in year 1980 by late Mr. Anil Agarwal, a leading figure in India's environment movement, to analyze and study the relationship between environment and development.

CSE's work is widely acknowledged for its intellectual leadership and the institution has grown into one of India's most influential and highly vocal environmental NGO. CSE received prestigious international awards **Stockholm Water Prize** in the year 2005 and the **Prince Albert II of Monaco Foundation Water Award** in the year 2008. CSE is actively working in India and South Asia (Bangladesh, Nepal, Bhutan and Sri Lanka).

The centre is recognized by the Government of India as:

National Knowledge Resource Centre (KRC) in the area of sustainable drinking water and sanitation by the Union Ministry of Drinking Water and Sanitation.

Centre of Excellence (CoE) in the area of sustainable urban water management by the Union Ministry of Urban Development.

Nodal Institute for conducting short & long term training programmes for environment regulators by the union Ministry of Environment and Forests (MoEF).

Some notable environmental programmes run by CSE include following:

Sustainable water management that mobilized the country through a water literacy campaign calling for decentralized solutions to water harvesting, control water pollution, urban sewage management, catalyzing policy changes at both national and state levels. In recognition for its efforts, the CSE was awarded the Stockholm Water Prize in year 2005, the highest international award in area of water management.

Food safety and toxins programme has created far-reaching changes in the policies and regulations governing the use of toxins such as pesticides and heavy metals. The two high profile studies (in year 2002&2003) that found high concentrations of pesticide residues in bottled water and soft drinks served to highlight public health concerns and are important contributions in managing the toxic fallouts of rapid economic and industrial growth.

Sustainable urban transport and air quality management that has achieved remarkable success in pushing for CNG in all public transport in Delhi and more recently, in pushing for better urban mobility options that have made significant impact on the city's air quality.

Sustainable industrialization is an innovative programme that rates the environmental performance of industry in high environmental impact sectors (such as cement, automobiles, pulp and paper, chlor-alkali, among others), helps motivate industries to make improvements in reducing pollution and improve efficiency of resource use. Green Rating Project (GRP) serves as a model for an alternative form of civil society governance to control industrial pollution in India, and today a good GRP rating is considered as a valuable certification about a company's environment performance.

Addressing the urgent need to introduce meaningful environmental education at the school level in India, CSE's **Green Schools Programme** goes beyond nature education to get children to evaluate and precisely measure their own environmental footprint using the Green Schools Manual. The Green Schools Network today includes more than 5,000 schools across the country, and the manual has been translated into Hindi, Kannada, Punjabi and Arabic. In addition, *Gobar Times*, a monthly magazine for children, keeps students informed and inculcates environmental values.

CSE has worked closely with journalists for long time, recognizing the powerful role that mass media plays in setting public agendas and shaping public opinion. CSE's **Environmental capacity building with emphasis on media** has several components, from regular briefing workshops for working journalists, maintaining a syndicated feature service to fellowship programmes that enable journalists to take time out to study and report specific issues in-depth.

In the year 2004 Anil Agarwal Green College (AAGC), an education and training initiative of CSE, was established to communicate the science, complexity and politics of environment across India, South Asia and the world. It seeks to build a constituency and cadre of knowledgeable, skilled and committed environmentalists - from students, decision-makers, field-level practitioners, civil society groups, journalists, lawyers, and concerned citizens. As part of this mandate, AAGC serves as a research, academic and capacity building hub that conducts a number of short and long-term courses and training programmes. Short-term courses range from technical workshops on how to build rainwater harvesting systems and decentralized wastewater treatment structures to policy briefings on ecological poverty and food safety, to hands-on training on environmental communication, information management and advocacy. Other training programmes – such as Environment Impact Assessment (EIA), Managing Urban Growth, and Urban Mobility, seek to actively engage with industry representatives and regulators in the country and across the developing world. Over the past five years or so, AAGC has conducted more than 100 training programmes and trained more than 2,500 participants from India and around the world. AAGC has conducted several longer-term courses, one set of which targets students and young professionals from India (titled 'Agenda for Survival' which is held in June each year), and others that target international students (titled 'Challenge of the Balance', which is held once in Winter and once in Summer each year).

In order to upscale the training and capacity building activities, the CSE is establishing an **Environment Training Institute (ETI)** at Tijara Block in the Alwar District of Rajasthan State in India. The ETI aims to strengthen capacities within the government, in the civil society, in the private sector and practitioners and the academia, and will be supported by state-of-the-art research, information services and a platform to interact and exchange ideas on best practices. The ETI will conduct short-term and long-term training programmes, tailored for different target groups, on a wide array of environment and development issues and topics. To encourage participation, the courses offered will be linked to the training needs of the specific target groups and will be synergized with certificate and diploma courses offered by mainstream universities, so that there is value addition to the career of the persons taking the courses.

Global Programme of CSE

The water programme of Centre of Science and Environment has evolved to help in establish policy principles, innovative technologies and implementation strategies for water and wastewater management in India. These efforts have been directed towards meeting the twin goals of laying the foundations for a water prudent society and adapting for climate resilience.

CSE has been an important thought-leader in water management sector. It has already influenced global policies and strategies to focus on the need for technologies to augment water resources in a decentralised manner through rainwater harvesting and to use that water to optimize on benefits. In 2010, CSE started the South Asia Water Programme. The programme involves three countries viz. Bangladesh, Nepal and Sri Lanka. Important objectives of the programme include awareness generation about environment and development as well as capacity building of societies to understand and deal the environmental issues. The programme is successfully ongoing since past five years. Though the main aim of the programme was training government and non-government partners, it has diversified to model curriculum development, knowledge support to a regional rain convention and providing technical guidance on the implementation of model projects related to sustainable water management. Centre has tripartite MoU with Lanka Rainwater Harvesting Forum (LRWHF) and Ministry of Water Supply and Drainage, Govt. of Sri Lanka.

We believe this experience needs to be leveraged to share solutions with other countries in the developing world from South America, Africa and Asia that are enjoined in a common struggle to find ways of meeting the needs of urban and rural populations in the current water and wastewater paradigm which are affordable and sustainable.

In coming five years, the Centre would like to build on expanding this work to other regions in the world in particular focusing on select countries in Africa through experience sharing workshops to identify gaps and challenges in urban water management and complement it later by capacity building in the region through tailor made training programmes.

Recently, centre organized India-Africa experience sharing workshops on mainstreaming sustainable urban water management. 18 Participants from 12 African countries participated in workshop to discuss about status of water and waste water management in respective countries. To find out more visit <http://www.cseindia.org/content/india-africa-experience-sharing-workshop-urban-rainwater-harvesting-mainstreaming-sustainabl>

About Lanka Rainwater Harvesting Forum (LRWHF)

Lanka Rainwater Harvesting Forum was established at the beginning of 1996 by a small group of interested persons. They are from a range of government and non-government institutions, including the National Water Supply and Drainage Board (NWSDB), Intermediate Technology Development Group Sri Lanka (ITSL), Community Water Supply and Sanitation Project (CWSSP), Church of Ceylon, Board of Women's Work, NGO Water Supply and Sanitation Decade Services, Agrarian Research and Training Institute (HARTI) and the Open University.

Lanka Rain Water Harvesting Forum was officially launched on the 19th of March 1997 by the then Minister for National Housing and Public Utilities, Hon. Nimal Siripala de Silva as the chief guest. The Forum is registered under the companies act No. 17 of 1982 as a non-government, non-profit making organization under the Ministry of Social Services.

Source: http://lankarainwater.org/wp/?page_id=118

About the training programme:

The centre is organising the first international training programme jointly with Lanka Rainwater Harvesting Forum, Sri Lanka local partner and host institution at Colombo.

Aim: Capacity building of the practitioners, both state and non state actors to implement best management practices (BMPs) for sustainable urban water management.

The four days training will be interactive and include following themes:

March 23 & 24, 2015

First two days of the training will be on **Urban Rainwater Harvesting (URWH)** and will focus on urban rainwater harvesting (RWH) and the potential it holds in augmentation of water availability by using public spaces to recharge their groundwater or store and reuse the rainwater. The training will also showcase examples to bring in required laws to enable individuals to undertake rainwater harvesting. The participants will get the opportunity to plan and design a rainwater harvesting system.



March 25 & 26, 2015

Training on **Decentralised Wastewater Treatment and Reuse**, the two days programme will focus on decentralised wastewater treatment (DWWT) including recycling and reuse. The training will provide hand on experience in planning, designing implementation of DWWTS and monitoring.



Both the trainings are conducted based on state of the art teaching & learning tools consisting of interactive sessions, experiential learning using detailed case studies, working in groups on planning and designing and class room lectures/instructions.

Following training programme, one day field exposure visit is planned to visit decentralised water management at institutional scale. The visit will provide an opportunity to interact with implementers of rain water harvesting and decentralised wastewater management system.

Faculties and Organizers



Suresh Kumar Rohilla

*Programme Director, Water Management Unit,
Centre for Science & Environment, New Delhi
Email: srohilla@cseindia.org*

Dr Rohilla coordinates the water Programme at CSE. He has over 20 year experience in planning and development of sustainable water and wastewater, drainage, environment improvement and area development/township projects aimed at mainstreaming environmental sustainability in the urban context. He holds a doctoral degree from Queen's University Belfast, North Ireland. He was a Fulbright Fellow affiliated at University of California, Berkeley in 2012 and Chevening Fellow at University of Bradford, U.K in 2001. He has been nominated as the expert member of the various committees set up by Central / State Governments and international professional bodies.



Tanuja Nalika Ariyananda

*Director, Lanka Rain Water Harvesting Forum, Colombo, Sri Lanka
Email: tanuja@sltnet.lk*

Ms. Ariyananda is Director of Lanka Rain Water Harvesting Forum since its inception in 1996. She is doctorate in Environmental Science, from University of Kelaniya, Sri Lanka. She has done her post graduation in Aquatic Resource Management from King's College London; & graduation in Applied Biology from University of Wales, UK. She was President of International Rainwater Catchments Systems Association, IRSCA from 2004-2012.



Uday Bhonde

*Deputy Programme Manager
Centre for Science & Environment, New Delhi
Email: uday@cseindia.org*

Uday is doctorate in Geology. He is coordinating the training programme of capacity building of urban local bodies (CBULB) sponsored by Ministry of Urban Development, Gov. of India. He is also involved in preparing curriculum and modules for trainings in sustainable urban water management. He conducts sessions in training programmes on sustainable urban water management for urban local body officials, practitioner engineers, architects, planners. He has previously contributed in implementation project on conjunctive water management to reduce impacts of anticipated climate changes by appropriate adaptation measures. He has published several articles in national and international journals.



Shivali Jainer

Senior Research Associate - Centre for Science & Environment, New Delhi
Email: shivali@cseindia.org

Shivali Jainer is post graduate in Environmental Planning from School of Planning and Architecture, Delhi. She is trainer in urban water management training programs for municipal functionaries, practitioners, academicians, policy makers etc. and is involved in development of tools for designing sustainable urban drainage system in urban areas. Her previous experience includes training and research on urban metabolism and growth with field of research focusing on evolving strategies for storm water drainage and resource management in urban areas.



Chhavi Sharda

Research Associate
Centre for Science & Environment, New Delhi
Email: chhavi@cseindia.org

Chhavi Sharda is post graduate in Environmental Engineering. She holds PG Diploma in Urban Environmental Management and Law. She has been conducting technical sessions in capacity building programs for municipal functionaries, practitioners, academicians, policy makers on decentralized wastewater treatment for water sensitive planning and urban lake conservation since a year. She has documented case studies on decentralized wastewater treatment systems across India. She also supports technical consultations on planning and designing of decentralized wastewater treatment projects. She has keen interest in improving her knowledge on water/ wastewater management approaches.



Ridhima Gupta

Research Associate
Centre for Science & Environment, New Delhi
Email: ridhima@cseindia.org

Ridhima Gupta is post graduate in Environment and Development, from the London School of Economics and Political Science. She has researched on the complexities of the linkages between environmental and economic development and has an understanding of environmental policy, management and evaluation in the developing country context. Furthermore, she also has experience in conducting trainings on the subject of "urban lake management" for officials from urban local bodies in India. Her previous experience includes looking at the implementation of "environmental flows" as a policy for the Ganges river in India.



Ama Rajakarunanayke

Communication & IT Administrator
Lanka Rain Water Harvesting
Email: lrwhfcmb@gmail.com

Ama Rajakarunanayke is presently reading for the masters program in Geographic Information System (GIS)/ Remote Sensing (RS) at University of Jayewardenepura. She is conducting research on impact of rainwater harvesting for CKDu affected communities, Vavuniya District, Sri Lanka.



Rajith Waruna Kumara

Accountant
Lanka Rain Water Harvesting
Email: lrwhfcmb@gmail.com

Rajith Waruna Kumara work as an accountant at Lanka Rain Water Harvesting Forum since February 2012. He has 12 years' experience in the field of accounting, finance and audit. His education background is B.com from Peradaniya University, AAT (SL), ACCA (UK) (Part).

Training Programme Schedule

Training on Urban Rainwater Harvesting : 23-24 March, 2015			
Time	Module	Session	Faculty
Day 1 (23rd March 2015)			
8:30-10:00	Registration		
10.00- 10.40	Inauguration	Welcome Addresses	
10.40-11:00 Tea break			
11:00-11:20	Opening Session	Introduction of participants	SR
11:20-11:40		Urban Water Challenges and Best Management Practices – WSUDP	
11:40-12:00		URWH in Sri Lanka – An overview	TA
12:00-12:20		URWH in India – An overview (including international case examples)	UB
12:20-13:00		Short Country Presentation – Africa (2-3 min. each)	Participants
13:00-14:00 Lunch break			
14:00-14:45	Planning of URWH systems	Components of URWH	UB
14:45-15:30		Documentary film-‘Rain Catchers’ (duration 45 min.) followed by Focused Group Discussion	SJ
15:30-15:45 Tea break			
15:45-16:45		Data collection requirements & economic considerations in URWH	UB
16:45-17:00	Planning of URWH systems	URWH: Storage and Recharge	SJ/UB
17.00-17.30		Feedback: Day 1	RG
19.00-21.00 Reception Dinner: Cinnamon Grand Hotel			
Day 2 (24th March 2015)			
8 :30-11:00	Tools & Techniques for URWH	Hands-on Assignment: Plan & Design URWH	UB
10.00-10.15 Tea break			
11.00-12:00		Group Presentations	CSE/LRWHF
12.00-12.30	Audio-Visual	Documentary film: ‘Designs that hold water’ - Sustainable drainage systems explained’ (26 min.) by EA, UK & Leeds City Council followed by Focused Group Discussion	UB
12.30-13.30 Lunch break			
13.30-14.15	Surface Runoff/ Flood Management	URWH options at various scales	SJ
14.15-16:00	Practices	Swales and Bio-retentions Ponds	UB
16:00-16:00 Tea break			
16:00-16:45		Swales and Bio-retentions Ponds	SJ
16.45-17:00		Feedback: Day 2	RG

Training on Decentralized Wastewater Treatment and Reuse: 25-26 March, 2015

Time	Module	Session	Faculty
Day 3 (25th March 2015)			
8:30 - 9:00	Overview of waste water management	Thematic Overview	CSE/LRWHF/LE
9.00 - 10:00		Understanding waste water and its characteristics	UB
10.00 - 10.15 Tea break			
10.15 - 11.15	Planning and Designing DWWTs	Introduction - DWWT systems	UB
11.15 - 12.30		Documentary film: 'Clean Your Act' (duration 45min.) followed by short discussion	RG
12.30 - 13.30 Lunch break			
13.30 - 15:00	Planning and Designing DWWTs	Planning and Designing of DWWT	CS
15.00 - 15.30		Construction of DWWT system	UB
15.30 - 15.45 Tea break			
15.45 - 16.45		Operation and Maintenance of DWWT systems	RG
16.45 - 17.00		Feedback : Day 3	RG
Day 4 (26th March 2015)			
8:30 - 10:00	Tools & Techniques - design DWWTs	Do it Yourself : Plan and design of DWWT	CS
10.00 - 10.15 Tea break			
10:15 - 11:30	Tools & Techniques - design DWWTs	Do it Yourself: Plan and design of DWWT	CS
11.30 - 12.30		Group Presentations	CSE/LRWHF
12.30 - 13.30 Lunch break			
13.30 - 14.00	Natural Treatment Systems in DWWT	Constructed wetlands and Bio-remediation in DWWT	CS
14.00 - 14.45		DWWT systems at various scales with case studies (CSE)	UB
14.45 - 15.30		Experience Sharing/Q&A session	Participants
15.30 - 15.45 Tea break			
15.45 - 16.30	Feedback	Smilies Evaluation/Certificate Distribution/Closing Ceremony	RG
16.30 - 17.00		Feedback: Day 4	
Day 5 (27 March 2015)			
Time	Module	Site Name	Facilitators
8:30 to 17:00	Field Exposure Visit	Visit to Millennium City, Malabe (40 kms away from Colombo) and Rain Centre, Colombo, Sri Lanka	LRWHF/CSE
Day 6 (28 March 2015): Free day			

SR - Dr. Suresh Kumar Rohilla, CSE
 UB - Dr. Uday Bhonde, CSE
 CS - Ms. Chhavi Sharda, CSE
 LE - Local Expert

TA - Dr. Tanuja Ariyananda, LRWHF
 SJ - Ms. Shivali Jainer, CSE
 RG - Ms. Ridhima Gupta, CSE

Training Participants: Mainstreaming 23-26 March, 2015

Egypt
Dr Aiman Mohamed Khalil Ibrahim
Secretary General
Drainage Research Institute (DRI),
National Water Research Center [NWRC]

Senegal
Mr. Gueye Amadou
PhD Student
Cheikh Anta Diop University and
Sandec/Eawag

Ghana
Ms. Barbara Gyapong Korsah
Research Manager
College of Engineering, Kwame Nkrumah
University of Science and Technology
(KNUST)

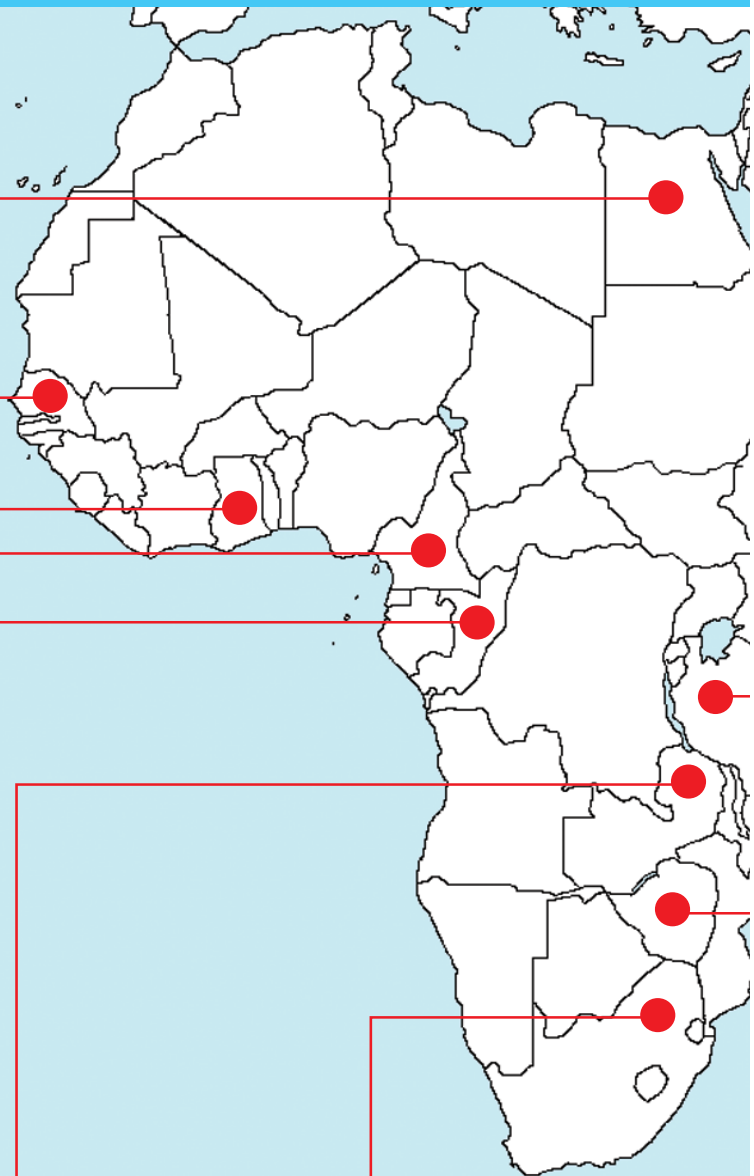
Mr. David Nii Amanor Blankson - Darku
Civil Engineer
Ghana Water Company Limited

Cameroon
Mr. Ebenezer Soh Kengne
Assistant Lecturer
Department of Plant Biology
University of Bamenda

Congo
Ms. Clarisse Kaka Mufwaya
Assistant Lecturer
Faculty of Agricultural Sciences,
University of Kinshasa

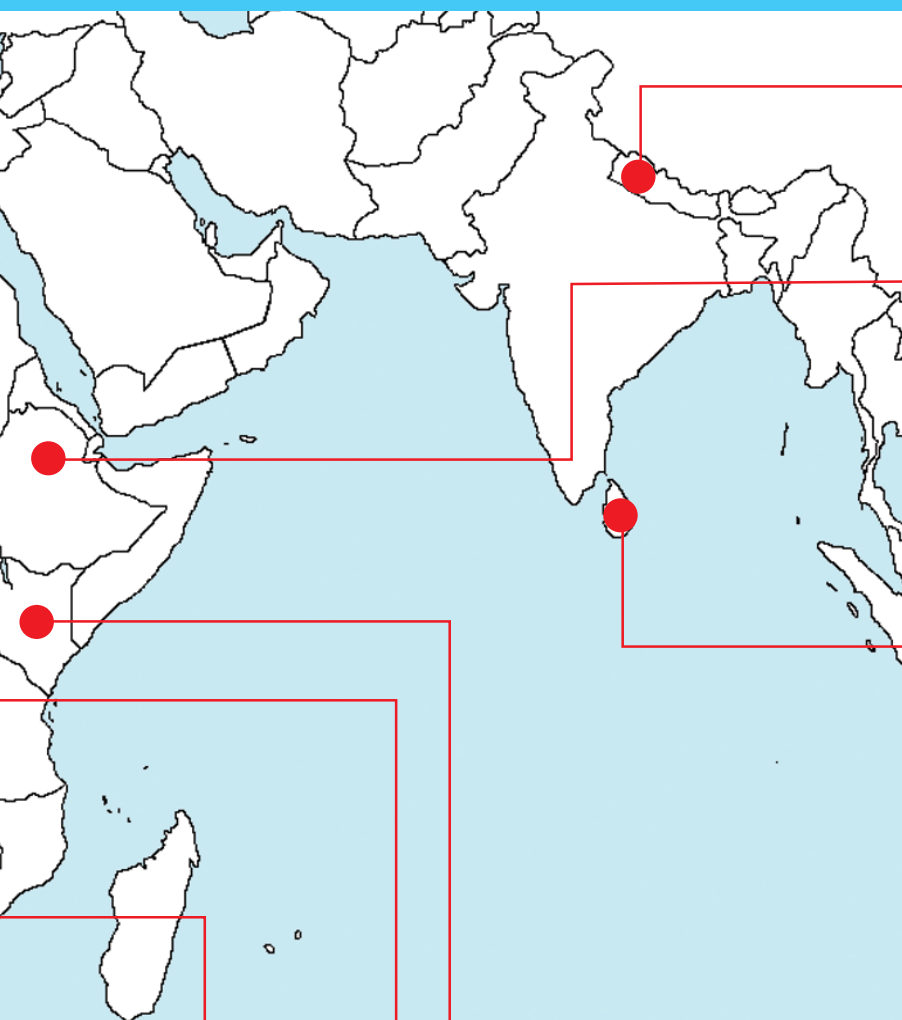
Zambia
Ms. Monica Mitti Mwiche
Quality Control Manager
Kafubu Water and Sewerage
Company Limited

South Africa
Ms. Nosiphiwe Ngqwala
PhD Student
Department of Pharmacy
Rhodes University



Sustainable Urban Water Management

● Colombo, Sri Lanka



Nepal

Ms. Sushma Acharya
Research Associate
Nepal Water Conservation Foundation

Ethiopia

Mr. Elias Gebeyehu Ayele
Lecturer
Engineering Department
Arba Minch University, Institute of Technology

Mr. Haftom Kahsay
Supervisor
Tigray bureau of water and mine energy

Sri Lanka

Mr. Mohamed Saif Saeed
Ms. Annet Premalatha Kabistan Royce
Ms. R M Nisansala S Ranundeniya
Mr. Lankabarana Dimantha Dharshana Weliange
Ms. C.N. Gamage
Ms. Tharangani Wickremasinghe
Dr. Priyantha Liyanage
Mr Bandula Jayarathna

Kenya

Ms. Anne Wanjiru Wambugu
Lecturer
Kenya Water Institute (KEWI)

Mr. Gerphas Keyah Opondo
Director
Environmental Compliance Institute

Ms. Celline Achieng
Project Coordinator
East African Wild Life Society (EAWLS)

Tanzania

Ms. Martha Raymond Ngalowera
Environmental Education Officer
Vice President's Office
Division of Environment

Zimbabwe

Mr. Garikaimose Tongowona
Programs Officer
Aquaculture Zimbabwe

Mr. Vincent Itai Tanyanyiwa
Lecturer
Zimbabwe Open University

Mr. Sikhumbuzo Ncube
Engineer
Engineering Services Department, City of Bulawayo

Field Exposure Visit

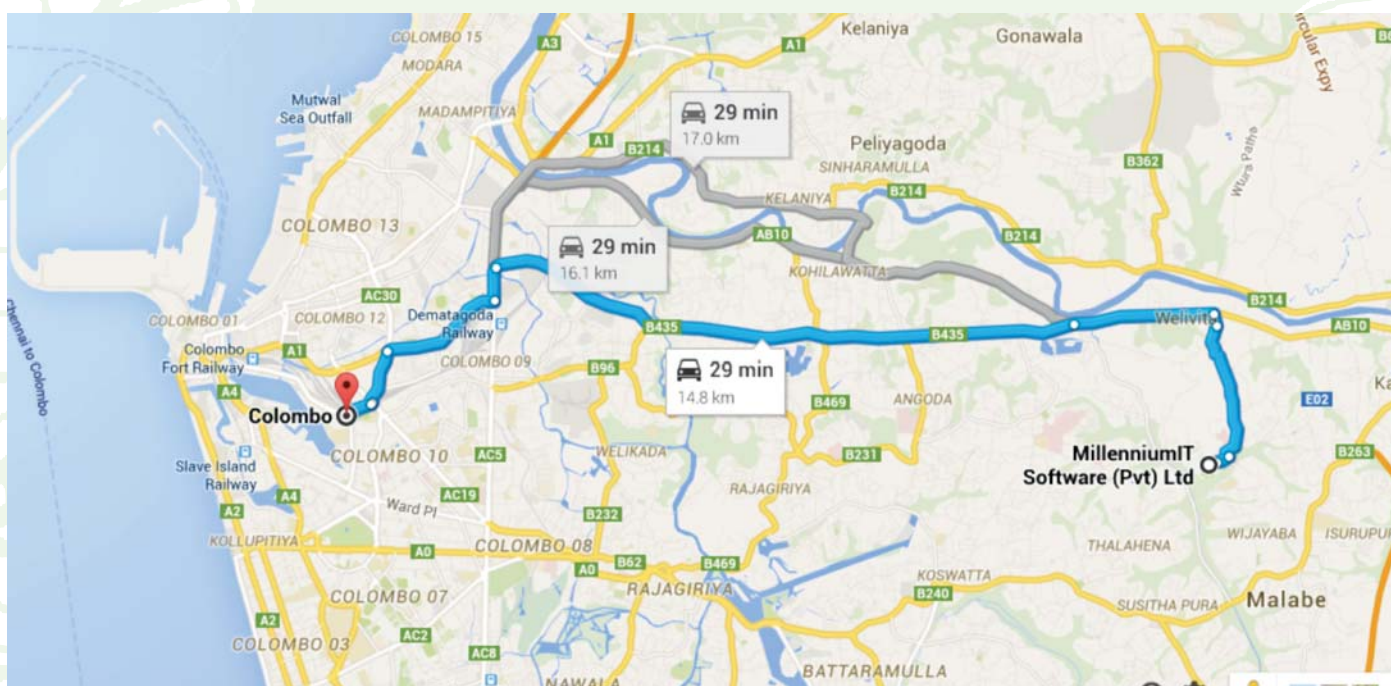
Departure time from Hotel : 8.30 AM | Arrival time: 5:00 PM

Site 1: Millennium Information Technologies Ltd., Malabe, Sri Lanka

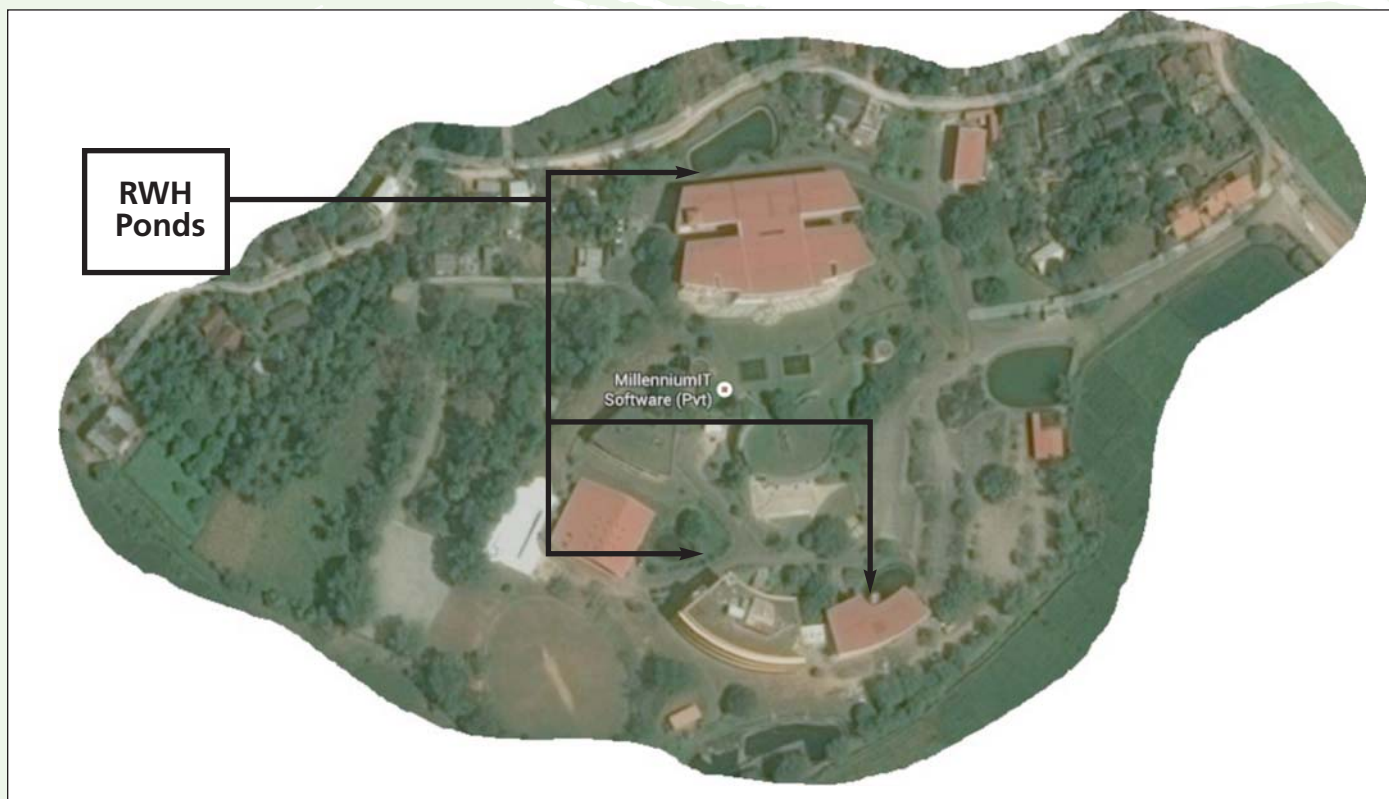
Implementation: Rainwater harvesting and Waste Water Recycling



Location: Millennium City, Malabe, a state of the art soft ware company is situated about 40 Km. from Colombo city. The complex is spread in 12,000 m² and is developed on a 6.5 ha sloping site. About 200 staff occupies the space.



Route Map and Building Complex



Source: Google Maps

Water Requirements

- Present occupation: 300 pax
- Estimated max. demand for water (incl. swimming pool and landscaping): 150 m³ per day
- Projected occupation: 600 pax/ projected and water demand: 195 m³ per day

How the demand is fulfilled

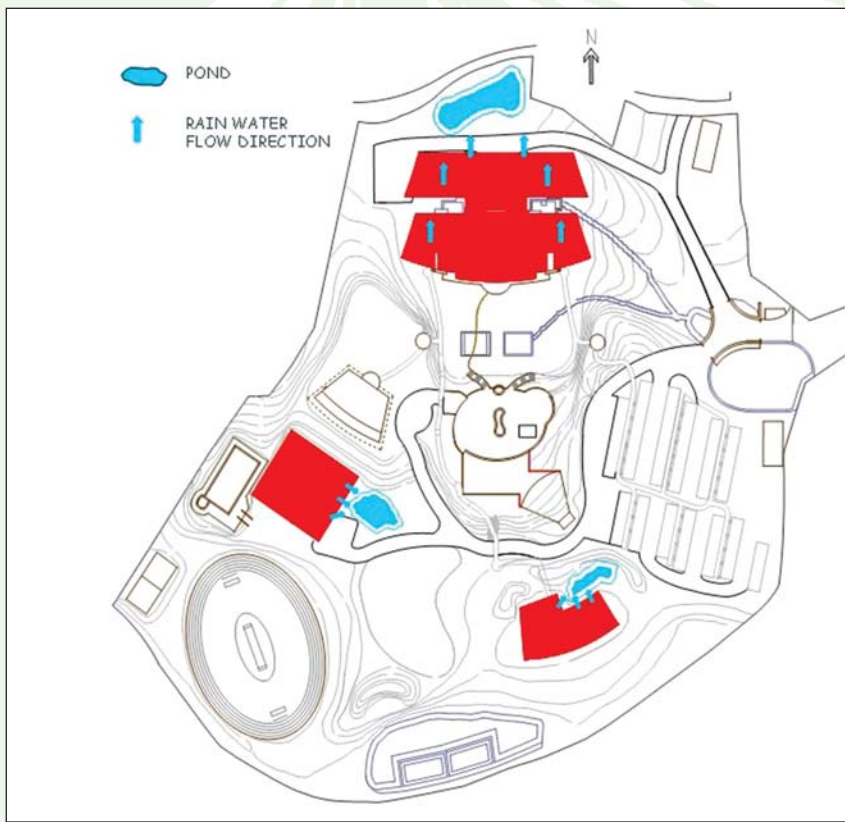
Demand Composition at Millennium IT Campus

	Immediate (300 pax)	Future (600 pax)
Water of drinking quality (for washbasins, showers, swimming pool)	40 m ³ /d	69 m ³ /d
Water for toilet flushing – harvested rainwater	22 m ³ /d	38 m ³ /d
Water for landscaping (recycled waste water and stored surface run-off water)	88 m ³ /d	88 m ³ /d
Total demand	150 m³/d	195 m³/d

Rain water harvesting system highlights:

- The RWH system is designed for a 90 days dry period
- Rainwater from 5,525 m² roof area of 3 main buildings is collected (except from roof gardens) and stored in three ponds with a volume of 2,315 m³
- The rainwater ponds are part of the landscaping of the complex
- Ponds are constructed using HDPE foils and are finished with block work
- Harvested rainwater from the ponds reaches the pump & filter units by gravity
- 2 systems (north and south) service the complex taking advantage of the topography of the site
- Through pressurized pump systems water is supplied using a dedicated network: no connections to the drinking water supply system
- Back-up system: provision to supply pump units with water from NWSDB network

Design and Site Photographs



Storage tanks



Storage Ponds

Operation

Rain water meet about 70% of the water demand. Rain water is used for toilet flushing, gardening and washing

Landscaping and recycling

- All black & grey water of the campus is recycled to a quality suitable for landscaping using a network of septic tanks and a central vertical flow filter with subsequent ponds
- Entire system is a gravity system
- Balance water requirement for landscaping purposes is met by collecting surface run-off in a pond of a volume of approximately 1,450 m³ located at the lowest point of the complex

**Benefits**

- Rainwater harvesting combined with on-site effluent treatment and reuse of recycled water adds up to a water “saving” of 75%
- The system assures that the interventions into the natural water cycle are virtually zero, as harvested water is finally used on-site for landscaping (with a time delay)
- Rainwater harvesting as a positive peak flow reducing measure
- Considering the scarcity and value (... not yet cost ...) of clean water rainwater harvesting has the potential to contribute significantly to the protection and conservation of one of our most valuable resources - water

Source: Extracted from the Paper presented by Arch. I. D. Kurupu, Synergetics Lanka (Pvt.) Ltd. at the Workshop held at the Ministry of Urban Development and Water Supply on “Rain in the City” organized by LRWHF 2004

CSE Publications and Reports

CSE publishes books, manuals and reports on environmental issues for knowledge dissemination. Some of recognized publications related to water and sanitation are shown below. For more information on the publications visit CSE Store.



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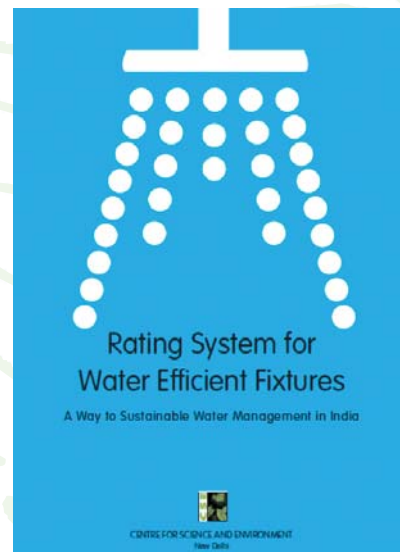


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Rating System for Water Efficient Fixtures: A way to sustainable water management in India

CSE has developed a paper titled 'Rating System for Water Efficient Fixtures in India', as a part of its work as Centre of Excellence under Ministry of Urban Development.

Building water use constitutes a very high percentage in the total city water use profile. The nature of water use within a building is directly related to the building functions, type of equipments installed etc. Fixtures in bathrooms, toilet and kitchen consume more than 40% of total building water use. This is a cause of concern since India is facing severe water crisis in terms of declining availability and quality affecting millions of people. But, there is ample potential for efficiency improvement!



Policy Paper on Septage Management in India

CSE has developed a "Policy Paper on Septage Management in India" as deliverable of Centre of Excellence in the area of sustainable water management under the Ministry of Urban Development. This document on septage management aims to assist the Government of India towards preparation of national level septage management policies and guidelines.

Access to improved sanitation in urban India has risen but the management of onsite sanitation systems such as septic tanks remains a neglected component of urban sanitation and wastewater management.

Septage, which is a fluid mixture of untreated and partially treated sewage solids, liquids and sludge of human or domestic origin, flows out of septic tanks and enters waterways or is generally disposed into nearest water body or low lying areas.

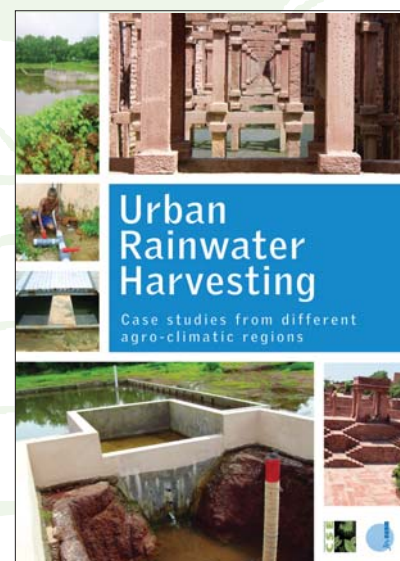


Urban Rainwater Harvesting: Case studies from different agro-climatic regions

This report has reviewed 12 case studies out of total over 80 RWH projects identified from across India. After detailed analysis of successfully implemented RWH projects from different agroclimatic settings two case studies have been selected – one each from low (scanty) and very high rainfall area.

First, is the case study of a residential complex in Umaid Heritage – Birkha Bawari located in Jodhpur, Rajasthan known for low and scanty rainfall. Second, case study is of Goa University campus located in very high rainfall region. In other words, people have implemented RWH, with the excesses of water, and its scarcity.

The sustainable water management requires understanding the value of rain, and to make optimum use of rainwater at the place where it falls.



Decentralised Wastewater Treatment and Reuse

This report has reviewed 11 case studies out of total 19 projects of DWWT identified from across India. After detailed analysis three case studies of implementation on different scale have been selected – one each at community, institutional and individual household building. All three case studies use natural technologies with minimal or no electricity requirement for treating wastewater and also locally reuse treated water. First, is the case study of Naval Civilian Housing Colony located in Kanjurmarg, Mumbai known for neighbourhood/community scale wastewater treatment using – Soil Biotechnology (SBT). Second, case study is of the National Environmental Engineering Research Institute (NEERI), Worli, Mumbai treating wastewater using – Phytoid Technology. Third, case study is of individual household building DWWT system located in Sangli City, Maharashtra. The wastewater is treated using – Fixed Film Biofilter Technology (FFBT).

The sustainable water management requires understanding the potential of local reuse.

Decentralised Wastewater Treatment: A way to manage septage in Shimla

CSE has submitted a report on septage management in Shimla as a part of its deliverable as Centre of Excellence in the area of Water Management under Ministry of Urban Development.

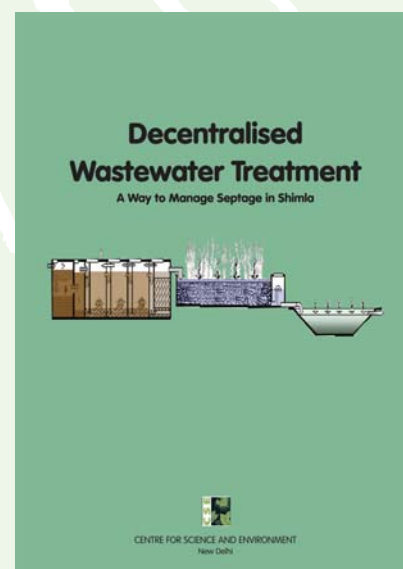
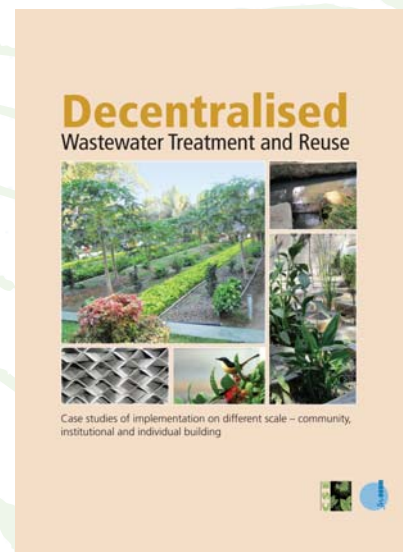
The main city of Shimla is connected to a centralised sewerage network but the outer areas are not adequately connected to this network. This paper explores the alternative methods of wastewater treatment and reuse based on the decentralised approach. It also covers techno- economic feasibility of the project for Shimla city and highlights the status of sewage management in the region along with role of septic tanks in unconnected areas.

CSE proposed implementation of Decentralised Wastewater Treatment Systems (DEWATS) in the identified zones by making improvements to the existing system. Decentralised system is an economical, cost effective alternative and offers long-term sustainability of the system.

Capturing Rainwater: A way to augment Chandigarh's water resources

CSE has submitted a report on city wide rainwater harvesting for Chandigarh as a part of its work as Centre of Excellence under Ministry of Urban Development. Chandigarh does not have any surface water source and there is a steep decline in the groundwater level in the city. The city has very few options for sourcing water, hence recharging the confined aquifers from where water is being tapped, becomes a necessity. Every summer, newspaper reports quote residents residing on the second and third floors in the southern sectors of the city complaining about the shortage of drinking water.

The water shortage is likely to get worse in the coming years as the population is already more than double the planned capacity for the city. CSE proposes way to augment the water sources of the city through harvesting the rainwater endowment of the city.





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