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The TERI University Newsletter

# Terra Matters

Volume 1

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## IN CONVERSATION



**Dr Arun Kansal**  
Head of Department  
and Professor,  
Department of  
Regional Water  
Studies





## FROM THE VICE CHANCELLOR'S DESK

Engaging with contemporary sustainability issues, building awareness and capacity on such issues, responding to identified needs through the development of new academic programmes, using mass media to share our views with the public at large, celebrating Indian culture and promoting a healthy living — the TERI University has become a very happening place! And in addition to all this a course load that can be termed to be medium to high. Located in a small campus, a relatively young university, it is demonstrating how a committed faculty/administration and an engaged student body together can contribute well beyond their size by stretching themselves a bit and using innovative approaches to have an impact.

However, we would like to be able to do much more. The goals that the world has set itself for 2030 on sustainability and climate change, call upon all of us to see what is the maximum that we can do — individually and collectively — to bring about transformative changes in society and in our development paths. The TERI University would be happy to partner with many more like-minded institutions/organizations in shaping and supporting 'our common future'.

This Issue takes water as its theme — the TERI University was happy to have partnered with the Bosch Foundation, the Coca-Cola Foundation, and USAID on a number of water-related initiatives as well as an inter-university competition on integrated water resources management that allowed us to engage a broad spectrum of our society on this critically important subject.

**Leena Srivastava**

Vice Chancellor, TERI University

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## FROM THE PRO-VICE CHANCELLOR'S DESK



In the realm of sustainable development, it is important to see that creation and dissemination of knowledge leads to positive effects at the grassroots level. With this in mind, students of the TERI University are groomed to be able to use theoretical underpinnings in solving problems with a holistic approach.

We are particularly encouraged by the enthusiastic response to the Entrepreneurial Development Cell created by the students of the University and by the fact that a fair number of our alumni have become entrepreneurs in various aspects of sustainable development—coming up with different approaches to solve various socio-economic problems in villages, on waste management, and even on e-commerce sites supporting social causes.

It should be obvious in today's context that universities can inculcate sustainability in their students, not just by incorporating more theory into their curricula but more so through an experiential learning platform of field work

and exercises to understand and reduce unsustainable impacts of present lifestyles. This has been and will continue to be the focus of the teaching–learning style at the TERI University.

TerraMatters is going to be our way of reaching out to the world and bringing focus on issues that matter, issues which urgently require our attention, and how we could all contribute to a better environment. This edition is on Water and the issues around it.

**Dr Rajiv Seth**  
Pro-Vice Chancellor  
TERI University

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## SUMMER SCHOOL ON MANAGING RISKS AND CHALLENGES IN URBAN WASH SERVICE DELIVERY

**3–7 AUGUST 2015**

The Summer School organized by the TERI University and TERI in partnership with USAID and Coca-Cola Foundation, is an endeavour to capture the momentum created by the Swachh Bharat Abhiyan (Urban) to enhance cities' livable environment through practical problem-solving approach. The host organizations felt it compelling to create an appropriate platform for augmenting capacity among key stakeholders to address practical challenges associated with the urban WASH sector.

During the programme participants were exposed to comprehensive lectures including discussions, analyses of cases, and open debates. A field visit was conducted for holistic, interdisciplinary,



and solution-oriented learning. The programme witnessed participation from multiple stakeholders including government officials, NGOs, academicians, corporate sector executives, and students.

## INTERNATIONAL YOUTH DAY

**AUGUST 12, 2015**

The International Youth Day celebrations at the TERI University had a sombre tone this year. It was in honour of late Dr A P J Abdul Kalam, India's former President. The event started with a biographic account of the former President followed by a splendid fusion of warm violin and balanced guitar play clubbed with contemporary dance all set to Dr Kalam's poetry rendered by students of the University. Thereafter, the Eco-club's Secretary introduced the audience to 'Plant a Wish' Tree concept. The event concluded with an inspirational tribute to Dr Kalam by Dr Rajiv Seth, Pro-Vice Chancellor, TERI University.



## INDEPENDENCE DAY EVE CELEBRATIONS

**AUGUST 14, 2015**

Independence Day at the TERI University was a joyous occasion. The event commenced with a talk by Dr Rajiv Seth, Pro-Vice Chancellor, emboldening the students to strive towards excellence followed by a cultural programme. Ms Nishtha Verma, student, MSc ESRM, gave a solo dance performance on Ganesh Vandana followed by a fascinating group musical composition by the members of Music and Dance Club. TERI University's Nukkad Natak Samiti presented a skit on 'Badalta Bharat,' highlighting our perpetuated fight for liberation, equity, and justice even after 68 years of independence.

A suitable end to the afternoon's performances was an upbeat medley of dance performances depicting women empowerment. The performances were exhilarating and enthused the audience bringing the celebrations to a fitting close.



## TRAINING ON RESEARCH SUPERVISION SKILLS

24–28 AUGUST 2015

The TERI University organized a five-day training programme on 'Research Supervision Skills' for the faculty of Royal University of Bhutan (RUB) from 24–28 August 2015 at TERI University, New Delhi. The workshop targeted young faculty members with an objective of understanding the processes, practices, and outcomes of the research supervision. At the same time it focussed on developing skills to improve the quality of research supervision. The participants included young and senior faculty members, deans, and directors from various colleges and institutes under the RUB. A total of 17 faculty members from various disciplines of Sciences, Humanities, and Social Sciences attended the five-day training programme. The resource persons from the TERI University, Jawaharlal Nehru University, and Delhi University provided training on key thematic areas that included sustaining student engagement in research as career, supervision for high-quality publications, ethics of doing research, etc. During the programme, participants got exposure to best practices of supervision of research scholars in social sciences, humanities, and natural sciences through discussions and case studies. An emphasis was laid on interdisciplinarity of research agendas and engagement with academic and non-academic fraternity.



## TEACHER'S DAY

SEPTEMBER 5, 2015

Teachers are the torch bearers of gen-next. They play a major role in making their students responsible citizens of tomorrow and good human beings. Students at the TERI University celebrated Teacher's Day with great enthusiasm and fervour. They put their best foot forward to pay tribute to their teachers. The students organized a small get-together inviting all teachers for a programme, which included a cake cutting ceremony, distribution of mementos to faculty members, music and dance performances both by students and the faculty. It was a fun-filled event.



## TU SPORTS MEET

7–24 SEPTEMBER 2015

Dr Rajiv Seth, Pro-Vice Chancellor, TERI University, inaugurated the TERI University Sports Week (TSW) 2015 on September 7, 2015, an annual sports extravaganza organized by TU Sports Club. The event was held at the TU amphitheatre. Mr Anil Gupta, Chief Advisor for India and South Asia, Aptoide and Manas Awasthi, Student, Water Science and Governance Programme, TERI University were the key sponsors of the event.



## 6 News at a Glance

The two-week long event included sports, such as badminton, table tennis, cricket, athletics, volleyball, football, basketball, and carom. The event concluded on September 24, 2015 followed by a prize distribution ceremony on November 3, 2015. All the sports events took place in the TU campus except cricket and athletics, which were held at TERI Gram, Gual Pahadi, Gurgaon.



## RETOPIA 2015

11–12 SEPTEMBER 2015

TERI University organized its annual technical symposium RETopia on 11 and 12 September 2015 on campus. Dr Ajay Mathur, Director General, Bureau of Energy Efficiency (BEE) was the Chief Guest. Interactive sessions on Day I and II gave students an opportunity to express their views to professionals from the industry and government alike and helped them achieve a holistic understanding of the renewable energy sector. RETopia 2015 had several parallel events like Trouble Shooting Renewable Energy Problems, Renewable Energy Design (RED) Challenge, Poster Presentation, Group Discussion and Debate, Quiz, and Sustainovation, which were both informative and fun. Day II ended with the inauguration of a 48 kWp solar plant in the TERI University campus by Dr Chandan Mitra, Member of Parliament and Editor and Managing Director, The Pioneer. A cultural event was organized on both the days to help participants rejuvenate after a long day of hard work.



## SOLAR ROOFTOP SYSTEM AT TERI UNIVERSITY

SEPTEMBER 12, 2015

The TERI University added yet another 'green' feature to its repertoire when it inaugurated its new 48-kWp solar rooftop system on September 12, 2015 during the annual tech-fest RETopia. Dr Chandan Mitra, Member of Parliament and Editor and Managing Director, The Pioneer inaugurated the system by energizing one of the invertors. The University's solar rooftop system has a separate 5 kWp R&D plant meant specifically for hands-on training of students. This state-of-the-art grid-connected system comprises polycrystalline PV modules and SMA invertors. It is expected to generate about 1.5 million units of electricity over 25 years,



offsetting 15 per cent of the grid electricity. It would also result in mitigating around 1,400 MtCO<sub>2</sub> emissions. The solar plant is connected to the grid via a net-metering connection wherein any surplus energy generated by the plant will be fed back into the grid. The units fed back will be recorded and the electricity bill will be adjusted as per the net import and export of electricity. The system was setup under solar leasing model wherein the University had nothing to invest upfront. As per the power purchase agreement signed with the Renewable Energy Supply Company (RESCO), the solar-tariff, would remain, substantially lower than the grid-tariff. The RESCO would also take care of operation and maintenance of the system. However, the main motivation for the University to go in for the solar rooftop system was to bolster its philosophy of practicing what it preaches besides having something that physically manifests the theory that is taught, thereby providing students an actual feel.

## TRAINING ON 'ADMINISTRATIVE SKILLS FOR HIGHER EDUCATION ENVIRONMENT' FOR THE ROYAL UNIVERSITY OF BHUTAN

22–25 SEPTEMBER 2015

Representatives from the Royal University of Bhutan received training on 'Administrative Skills for Higher Education Environment' from the TERI University and TERI staff members and received a certificate of participation at the end of the programme.



## VISIT OF FRENCH AMBASSADOR

NOVEMBER 2, 2015

HE Mr François Richier, Ambassador of France to India, visited the TERI University to deliver the keynote address at the BLISS 2015–Winter School programme. HE Mr Richier discussed the challenges facing global and national economies due to climate change and unsustainability of consumption and production patterns and introduced the concepts that were debated and implemented in UNFCCC's COP21 on climate change held in Paris in December 2015.



## WINTER SCHOOL—BLISS 2015

2–6 NOVEMBER 2015

The TERI University organized the Winter School—BLISS 2015, from 2–6 November 2015 along with the United Nations Environment Programme (UNEP) under the aegis of the EU-funded Switch



## 8 News at a Glance

Asia programme focussed on the interdisciplinary training on the theme: 'Sustainable Development Goal (SDG) 12: Ensuring Sustainable Consumption and Production Patterns.' The primary aim of the Winter School was to facilitate an improved understanding of complexities relating to the sustainable consumption and production (SCP) and the significance of various strategy options and institutional arrangements to mainstream the SCP for effective policy planning. The sessions covered the 2030 SCP Agenda-SDG 12 and the 10YFP on SCP and also addressed key thematic areas, such as Business Case for SCP, Behavioral Change and Education for SCP, Sustainable Procurement, and Sustainable Urban Settlements and Integration of SCP into Policy at regional and national levels. More than 200 participants attended the Winter School both on-campus and online. The participants included government officials from South Asia (Bangladesh, Bhutan, Nepal, Sri Lanka, and India), researchers, practitioners, academics, and students.



## EXPLORE THE WORLD OF GREEN CAREERS

NOVEMBER 17, 2015

NDTV Prime spoke to students of the TERI University and Dr Prateek Sharma, Dean Academic, about why youngsters are shifting from conventional careers to 'green' careers. They looked at some of the environmental projects to better understand different work profiles the field had to offer students. The programme was for those who were keen on exploring career opportunities in environmental studies. For more details please visit <<https://www.youtube.com/watch?v=3Ex56D-s80w>>.



## INDIA'S SOLAR STORY: ARE WE ON THE RIGHT TRACK?

NOVEMBER 19, 2015

Mr Amit Kumar, Dean, Distance and Short-term Education, TERI University, was part of a panel discussion on NDTV Prime on the issue 'India's Solar Story: Are We on the Right Track?'. This was part of the 'Big Debate' series, moderated by Ms Manisha Natarajan, Senior Editor-Real Estate, NDTV. The programme was aired on TV on November 19, 2015. For more details please visit <<https://www.youtube.com/watch?v=B9ZIfPE49BM>>.



## WEBINAR SERIES ON AIR POLLUTION AND CITIES

NOVEMBER 19, 2015

Webinar Series on Air Pollution and Cities was launched in October 2015. As part of this series, the second webinar was held on November 19, 2015 at the TERI University campus. Prof. Viney P Aneja, North Carolina State University and Distinguished Visiting Fellow, TERI University, delivered a lecture on 'Ozone Pollution in Urban Environments'. The aim of the webinar was to disseminate knowledge related to ozone pollution, sources, and its impacts. It provided a holistic picture about pollutant formation and its mitigation measures.



## 'CAREER CAFÉ' EPISODES ON LOK SABHA TV

Lok Sabha TV featured some interesting chat shows with the TERI University faculty members on their 'Career Café' episodes. Details of the shows are as under:

- Dr Suresh Jain, Head of Department and Professor, Department of Natural Resources spoke on 'Careers after Environment Studies' on November 17, 2015. Available at: <<https://youtu.be/cxxMTxRQ3PM>>.
- Dr Shaleen Singhal, Head of Department and Associate Professor, Department of Policy Studies spoke on 'Careers in Urban Development' on November 24, 2015. Available at: <<https://www.youtube.com/watch?v=VGQI9MupBuw>>.
- Dr. Arun Kansal, Head of Department and Professor, Department of Regional Water Studies spoke on 'Careers in Water Studies' on 05 January 2016. Available at: <<https://www.youtube.com/watch?v=MgffbLpVDxE>>.



## UNIVERSITY OF TECHNOLOGY (UTS) DELEGATION VISIT TO TU

NOVEMBER 20, 2015

Delegation from University of Technology, Sydney (UTS) visited TERI University to broaden its base of engagement between UTS and TU. The meeting was to discuss about UTS's Key Technology Partnership (KTP) programme and to work together to develop plans for research collaborations in the near future.





## BOOK FAIR

NOVEMBER 20, 2015

Book fairs play an important role in promoting reading habit among students, researchers, faculty members, librarians, and book lovers. It is an important event at the TERI University, wherein the latest in electronic and print resources in a variety of subjects from various Indian and International publishers and distributors are displayed. The Annual Book Fair was held on November 20, 2015. Students who recommended the maximum number of quality books were rewarded with a motivational book. These students were: (a) Sharada Ramadass; (b) Mohammad Shahbaz Khan; and (c) Abhishek Saxena.

## INDIAN RAILWAYS CHAIR

NOVEMBER 23, 2015

The TERI University signed a Memorandum of Understanding (MoU) with the Ministry of Railways on November 23, 2015 to set up a Railway Chair on Sustainable Mobility at the TERI University, New Delhi. The MoU was signed in the presence of the Minister of Railways, Shri Suresh Prabhakar Prabhu. The Chair will focus and promote research on issues of sustainable mobility, use of energy efficient technology, and green energy initiatives by the Railways and would facilitate research into finding innovative solutions to these issues that are extremely important in today's environment. Signatories to the MoU were Dr Rajiv Seth, Pro-Vice Chancellor, TERI University and Shri Manoj Pandey, ED, Training and Manpower Planning, Ministry of Railways. Shri Pradeep Kumar, Member Staff, Railway Board was among those present on the occasion.



## TERI UNIVERSITY HOSTS ROUNDTABLE ON ANTI-NUKE INITIATIVES

DECEMBER 3, 2015

The TERI University jointly with the Embassy of Kazakhstan organized a roundtable on the theme 'Movement for the Cessation of Nuclear Testing Worldwide'. During the discussion, issues and problems that currently hinder a total ban of all types of nuclear tests worldwide and achievement of a nuclear-free world were highlighted. Speakers at the event read out reports on nuclear non-proliferation, cessation of nuclear tests, and Kazakhstan's contribution to the fight against holding nuclear tests throughout the world and its repeated calls for the signing of a petition banning nuclear tests of the 'ATOM' project. This was followed by a Q&A session.



## VISIT OF HON'BLE MINISTER SHRI PRAVEEN BALA AND THE HIGH COMMISSIONER OF FIJI

DECEMBER 11, 2015

Mr Yogesh J Karan, High Commissioner, Fiji and other Delegates from Fiji at the TERI University.



## 'GENEXT' EPISODES ON DD NEWS

(a) DD News featured Dr Suresh Jain, Head of Department and Professor, Department of Natural Resources, TERI University on its 'Genext' Air Pollution episode on December 19, 2015. Available at: <<https://www.youtube.com/watch?v=s42kHvPKJkM&feature=youtu.be>>.



(b) DD News featured Dr Suresh Jain, Head of Department and Professor, Department of Natural Resources, TERI University on its 'Genext' Odd-Even Formula in Delhi on Day 1 episode on January 1, 2016. Available at: <[https://www.youtube.com/watch?v=R1\\_I-iPmFMI](https://www.youtube.com/watch?v=R1_I-iPmFMI)>.

## CPCB SPONSORED TRAINING PROGRAMME ON 'IMPACT OF OZONE AND OTHER POLLUTANTS ON CROPS'

4-6 JANUARY 2016

This training programme provided a basic understanding of ozone pollution and its effect on the yield of several crops and other impacts. It also focussed on other pollutants, such as particulate matter and its cumulative impact on crops and plants.

With the help of lectures, case studies, and hands-on training, the programme addressed the following thematic areas:

- Introduction to air pollution, sources, and over all impacts
- Impact of air pollution on crops
- Modeling of air pollutants and impacts



## CERTIFICATE COURSE ON NUCLEAR ENERGY AND LAW

11–16 JANUARY 2016

The course was jointly organized by the Nuclear Law Association India (NLA) and TERI University from 11–16 January 2016. The objective of the NLA-TU Winter Course was to familiarize the participants with:

- Basic understanding of nuclear science and technology
- Legal history and international engagement with a focus on Global South
- Functioning of a nuclear power plant
- The IAEA—its history, codes, and guidelines and international nuclear treaties
- Regulatory structures and liability regimes of select jurisdictions

- India's nuclear laws and regulatory processes, siting and consent procedures, environmental law, and judicial decisions in India.

In association with the Nuclear Power Corporation of India Ltd (NPCIL), a technical study trip to the Narora Nuclear Power Plant in UP was also organized, which was for only Indian nationals. A certificate of participation was given to all the participants at the end of the course.



## TRAINING WORKSHOP ON GENDER SENSITIZATION

JANUARY 27, 2016

A workshop on Gender Sensitization was organized in the TU campus on January 27, 2016 for the faculty, staff members, and students. The topic of the workshop was 'Sexual Harassment at Workplace'. The programme was conducted by Ms Pauline Gomes, Manager, Curriculum and Leadership Development, Breakthrough.



## YOUNG RESEARCHERS' SCHOOL (YRS) ON 'SUSTAINABLE ENERGY FOR TRANSFORMING LIVES: AVAILABILITY, ACCESSIBILITY, AFFORDABILITY'

1–12 FEBRUARY 2016

The TERI University in association with the United Nations University Institute for Advanced Study of Sustainability (UNU-IAS), and ProSPER.Net Secretariat, organized a two-week long Young Researchers' School (YRS) on 'Sustainable Energy for Transforming Lives: Availability, Accessibility, Affordability' from 1–12 February 2016 at the University campus, New Delhi.



The main goal of the YRS was to provide PhD students an opportunity to better understand the spectrum of challenges that underpin sustainable development.

The participants were from eight different countries of the Asia-Pacific region. The school programme was aligned with the sustainable development goal number 7 and the participants were exposed to different aspects of clean and sustainable energy and related challenges through lectures, movies and field trips. While gaining specific knowledge regarding the theme, the participants through the school also got an opportunity to develop their research skills including communication skills through activities like a 3-minutes thesis competition, research communication session, and group work on research proposal development and presentation. By assembling these young researchers together, the school aimed to foster the growth of a network of sustainability scholars and professionals in the Asia-Pacific region.

## QUAESTUS

**FEBRUARY 3, 2016**

It was an interactive alumni-student event with the aim to provide a platform for current students to interact with the university alumni who ventured into entrepreneurship.

The alumni spoke about the challenges, motivation, and journey of starting a business venture. The present students learnt how to implement their ideas into successful business ventures. Mr Akhil Sood,

Alumni of 2014 MBA Infrastructure programme and Ms Devakshi Nayar, Alumni of 2013 MA Sustainable Development Practice addressed the current students and spoke at length about their startups.



## 3RD SUSTAINABLE ENERGY LEADERSHIP PROGRAMME (SELP)

**8–19 FEBRUARY 2016**

Sustainable Energy Leadership Programme (SELP) 2016 aimed at furthering South-South cooperation with a focus to hone leadership skills of participants by equipping them with an in-depth understanding of energy policy options, technology solutions, as well as financing and planning tools. Practitioners from 20 countries participated in a two-week programme co-designed by UNIDO. The programme was inaugurated by Dr Sijin Lee, President and CEO, Korea Environment Corporation. This is the third edition of the TERI-UNIDO SELP Series, which has so far trained 75 officials since its inception in 2014, encompassing more than 20 countries particularly those from Africa, the Middle East, South Asia, Southeast Asia, and Asia-Pacific regions. SELP 2016 was set out to help develop regional capacities to achieve the targets of renewable energy (RE) and energy efficiency (EE) in respective regions. The endeavour was to strengthen the capacities towards formulation and implementation of RE and EE policies, especially for sustainable and inclusive industrial development.



## TRAINING PROGRAMME ON 'APPLICATIONS OF SPECIES DISTRIBUTION MODELING' (SDM) IN BIODIVERSITY RESEARCH

19–21 FEBRUARY 2016

Species Distribution Modeling (SDM), or Ecological Niche Modeling (ENM) has emerged as a very robust and powerful tool to develop a deeper understanding on distribution of species with a wide range of applications like demarcation of areas for species reserves and potential areas for species reintroduction and conservation planning. It has proved to be extremely useful in studying and predicting the range shifts in species due to climate change.

The workshop was organized to build capacity of researchers and practitioners in SDM involved in biodiversity conservation studies. The training programme provided an overview of Species Distribution Modeling and its application in biodiversity research. The participants received hands-on experience on various aspects of SDM viz.: (i) Acquisition and processing of species occurrence and environmental data from various sources, (ii) Using software tools (DIVA and MaxEnt) to generate species distribution models, and (iii) Evaluate and validate species distribution models for practical and field applications. The training helped participants to generate distribution models independently and discuss it with the trainers.



## STRENGTHENING WATER AND SANITATION IN URBAN SETTINGS: INTER-UNIVERSITY COMPETITION ON WATER RESOURCES MANAGEMENT

JANUARY 28, 2016

The finals of the inter-university competition on water resources management was held on January 28, 2016 at the India Habitat Centre, New Delhi. The final round had 10 teams comprising winners and runners-up from the five regional-level competitions. The competition was designed to create awareness and research interest amongst undergraduate students in the field of water and sanitation. It has been accepted worldwide that engineering solutions alone can no longer be used to address the complex nature of water issues. Thus, the competition that was organized by TERI and the TERI University and funded by USAID, Robert Bosch Stiftung and WAPCOS focussed on engaging with youth to develop solutions for water management, which are holistic in nature and inclusive in approach.

The competition started in November 2014 with ninety university teams submitting their proposals. Seventy-five teams were initially shortlisted and were mentored by faculty members from the Department



of Regional Water Studies, TERI University and local partners at five regional centres. Two teams from each region were finally selected from the regional level competitions. These teams were then brought together in a week long

Edu-excursion camp in Delhi for a final round of mentoring with German experts. The team from TISS Guwahati was declared the winning team while Lovely Professional University, Jalandhar were the runners-up for the competition. The Lyallpur Khalsa College, Punjab got a special mention. The winning and runners-up team members were awarded either a six months internship with TERI or were given the option of pursuing any academic course in TERI University with tuition fee exemption. The seed money that was given to the winning team for executing the research proposal was ₹200,000 while for the runners-up team, the amount was ₹100,000. The third team was given ₹50,000/-. However, all the 50 finalists were made a part of the special task force created for the Swachh Bharat Abhiyan by the project management unit of SBM. The national competition was a huge success with the student community and was widely appreciated by the media and academic community.



## IN MEDIA



1. **Mr Amit Kumar, Dean, Distance and Short-term Education** participated in a panel discussion on 'Investing in RE: Challenges and Opportunities' at the Renewable Energy India Awards 2015. The event was telecast on ET NOW on October 20, 2015. Available at: <<https://www.youtube.com/watch?v=4wTpU50sYks>>.



2. **Dr Suresh Jain, Professor and Head, Department of Natural Resources** featured in the Hindi newspaper *Amar Ujala* on January 9, 2016 where his views on how to deal with the increasing pollution in Delhi were reported. Available at: <<http://epaper.amarujala.com/dl/20160109/12.html?format=pdf>>.

3. **Dr Suresh Jain, Professor and Head, Department of Natural Resources** joined Air Pollution Q&A and Tweet Chat organized by Green peace India campaign 'Clean Air Nation' on December 15, 2015. Available at: <[http://www.greenpeace.org/india/clean-air-nation/chat/?utm\\_source=twitter&utm\\_medium=post&utm\\_campaign=cleanairnation](http://www.greenpeace.org/india/clean-air-nation/chat/?utm_source=twitter&utm_medium=post&utm_campaign=cleanairnation)>.

4. An article written by Mr Amit Kumar, Dean, Distance and Short-term Education on 'Second Wind: DISCOMS' Finances Key to Growth of Renewable Energy' was published in the *Hindu Business Line* on August 14, 2015.

5. Interview of Mr Amit Kumar, Dean, Distance and Short-term Education on 'Building Skills: Need for Expert Manpower to Meet Ambitious RE Targets' was published in *Renewable Watch* Magazine in August 2015.

## HONOUR AND RECOGNITION



MP Ram Mohan, Associate Professor, Department of Policy Studies: Elected as President of Nuclear Law Association, India for the third term (2015–17)



Arun Kansal, Head of Department and Professor, Department of Regional Water Studies: Visiting Professor in 'Natural Science', University of Derby, United Kingdom (2015–18)



Vinay Kumar Tyagi, Assistant Professor, Department of Natural Resources: Member of the Scientific Committee of the Ajman 4th International Environment Conference 2016, held during 2–3 March 2016 in Ajman, United Arab Emirates.

## PRESENTATION/PARTICIPATION IN EVENTS

Name of the Faculty	Presentations/Lectures Delivered at Various Events
<p><b>Ms Fawzia Tarannum</b></p>  <p>Lecturer, Coca-Cola Department of Regional Water Studies</p>	<p>Sustainable Water Resource Management: Perspectives from Europe and South Asia. 28–29 September 2015 at German House for Research and Innovation, DWIH, Delhi. Presented her work on '<i>Community Engagement in Water Quality Management: Opportunities and Challenges</i>'</p>

**Mr Amit Kumar**



Dean, Distance and Short-term Education

India Off-Grid Energy Summit 2015. August 19, 2015, New Delhi. Thematic presentation on '*Off-Grid Energy: Technology Trends*'. Also co-chaired a session on '*Existing and Emerging Technologies*'

Roundtable Discussion on Renewable Energy Policy, Energy Access and Climate Change in India. August 27, 2015, New Delhi. Participated in the event

Global Bioeconomy Summit 2015. November 26, 2015 in Berlin, Germany Participated as a Speaker in the Session *Defining the Transition to a Sustainable Bioeconomy*. Details available at: <<http://gbs2015.com/home/> [http://gbs2015.com/fileadmin/gbs2015/Downloads/Communique\\_final.pdf](http://gbs2015.com/fileadmin/gbs2015/Downloads/Communique_final.pdf)>

**Dr Nandan Nawn**



Associate Professor, Department of Policy Studies

Training on Research Supervision Skills. 24–28 August 2015 at TERI University, New Delhi Presentation on '*Integrating Sustainability in Post Graduate Research*'

'Trust in Transactions', Economic Sociology Conference. 16–18 November 2015 at Institute for Development Studies, Kolkata (IDSK). Presentation on '*Law's Relationship with Trust: Distrust or 'Comfort Zone*'

# REDUCING ARSENIC POISONING OF MILLIONS ACROSS RURAL INDIA

Chander Kumar Singh, Assistant Professor, Department of Regional Water Studies, TERI University



Millions of tubewells across the Indo-Gangetic plain supply drinking water that is relatively free of microbial contaminants. But many of these tubewells tap groundwater containing elevated arsenic, which is only fit for washing purposes. Exposure to arsenic has been linked to increased deaths from cardiovascular diseases and various cancers as well as sizeable drop in household income. Arsenic in tubewell water has also been associated with increased infant mortality and impaired intellectual and motor function in children.

Much of the exposure to arsenic across South and Southeast Asia is avoidable. Distribution of arsenic in groundwater is highly variable spatially, even within a single village, but typically stable through time. Spatial variability complicates prediction but also provides an opportunity for households to share the subset of safewells. This new study, funded by International Growth Centre (IGC), has explored a new approach to field testing in order to distinguish safe from unsafe wells.

**Suitability of Field Testing:** The latest generation of field kits readily distinguishes the subset of wells within a village that can be used for drinking and

cooking from those that are suitable only for washing. Field kit testing is vastly preferable to laboratory testing because the results can be communicated directly to the households. The problem is that drilling of new wells continues unabated, and there currently is no financial incentive for testing new wells.

**Market for Field Testing:** In a recent intervention in the State of Bihar, we explored a novel semi-commercial approach to testing that could potentially reduce the proportion of untested wells. Twenty-six small- to medium-sized villages within a 250 km<sup>2</sup> arsenic-affected area south of the River Ganges were selected for the study. After delivering a public health message describing the risks of drinking high-arsenic groundwater, trained staff announced that they were going to offer to test wells at a given price over the next several days by going door-to-door throughout the village. The 26 villages were randomly divided in five groups and were offered testing facility at prices of ₹10, ₹20, ₹30, ₹40, and ₹50/test, respectively. Of the 1,804 households that could be contacted, 1,195 agreed to have their well tested for a fee during fall 2012. Overall, the proportion of households buying a test gradually declined from about 90 per cent at ₹10/test to 50 per cent at ₹50/test, although the proportion also varied at each price. Only 28 households claimed to know the status of their well even though this area has repeatedly been the subject of research and press coverage.

**Outcome of Testing:** Test results were posted by attaching a metal placard coloured red (>50 µg/Larsenic), green (>10–50 µg/L), or blue (<10 µg/L) to each pumphead to categorize the well as per the national standard: for arsenic at the time of 50 µg/L and WHO guideline of 10 µg/L, respectively.

Overall, the field staff attached blue, green, and red placards to 63, 17, and 20 per cent of the tested wells, respectively. The proportion of wells that were tested and turned out to contain  $>50 \mu\text{g/L}$  arsenic within each of the 26 villages varied widely from zero to a maximum of 80 per cent.

**Response to Testing:** After the IGC-funded portion of the study ended, a second survey was carried out to document household responses to the testing. A total of 1,037 of the 1,195 households that paid for a test during fall 2012 were re-visited during spring 2013. Overall, only 31 per cent households with a red well switched during the intervening period. This was surprising given that 72 per cent of the households live within 50m of at least one safe blue or green well. Also, switching by up to 70 per cent of households has been documented under comparable conditions in Bangladesh.

**Implications for Policy:** This intervention demonstrated that there is a market to have tubewells tested for arsenic. The ₹20 price that more than two-thirds of households in a village were willing to pay would be sufficient to cover the salary and transportation of a tester with secondary education, assuming 10–20 wells are tested in a day.

However, the generated income would not be sufficient to cover the estimated total cost of testing when quality control by a supervisor, a durable metal placard with the test result, kit supplies, and a GPS unit of ₹100– ₹150/test (US\$2–3) are included. These additional costs, would, therefore, have to be covered centrally in future testing campaigns. The State Health Society of Bihar has been contacted to discuss the possibility of a state-wide expansion of the tubewell testing campaign. However, the causes underlying the low rate of household responses compared to Bangladesh need to be investigated.

# CHANGING WATER SCENARIO WITH CHANGING TIMES

**Ranjana Ray Chaudhuri, Lecturer, Coca-Cola Department of Regional Water Studies, TERI University**

The gap between water demand and water supply has been a challenge to reduce. In 65 years since independence, India has built numerous dams, reservoirs to increase capacities to satisfy industrial, agricultural, and residential water demands. With advent of ground water utilization, irrigation became possible in areas where people earlier grew only one crop. Simultaneously, use of chemical fertilizers, and pesticides to increase crop yield was introduced. The industrial production of chemicals, pharmaceutical products and the like kept rising steadily. Increasing urbanization increased water demands due to life style changes. Though we have made progress in the field of water accessibility, yet water coverage varies from city to city.

Meanwhile, the status of water quality in our surface waters, whether it is rivers, ponds, or lakes, started deteriorating. Smaller lakes, ponds started losing importance as water utilities revolutionized the way water is supplied in India. They became easy outlets for sewage disposal as sanitation infrastructure planning was not a priority neither could it keep pace with urbanization. At still other places, unplanned urbanization, and skewed development aggravated the problem of sewerage and sewage treatment. Sewerage is a major challenge that will continue to plague us; in future, laying sewerage connections in older parts of cities is a huge challenge. For example, revolution in plumbing services and sewage treatment in the nineteenth and early twentieth century contributed immensely to Europe's progress. Europe became considerably healthy with plague and cholera epidemics eradicated. Burden from water-borne diseases reduced considerably. Over the years Europe systematically cleaned its major rivers like Rhine, Danube, and Thames. Work on River Seine and the like are going on currently; Europe has involved multiple stakeholders as well as different

countries who have interest in the river basin as a whole.

In India, we are yet to carry out a complete water quality assessment of our rivers and lakes to find out the extent of pollution and to prioritize the stretches that require urgent action. Then again, clean-up strategies can only help in the long run if the river basin or all lakes in the vicinity are considered holistically, instead of in isolation. Persistent organic pollutants are increasing with more pharmaceutical products entering the water cycle, which are quite impossible to treat with the currently available operational technologies; at the same time, ageing water treatment plants need to be upgraded. The groundwater quality problem is also not completely assessed; we are in the process of mapping our aquifers. It is a major challenge as the aquifers are geologically different in different parts of the country. Replenishment by recharge is not easy in aquifers in the Deccan region, yet exploitation continues unabated. Groundwater is a huge problem as it cannot be seen; the use of septic tanks in smaller towns and cities and lack of their maintenance raises new concerns. Our only hope of restoring water to its pristine quality lies with using treated wastewater extensively. We have plans to augment our water supplies in the near future; simultaneously waste water quantity too shall increase, and planning its treatment and disposal needs equal focus if not more.

Sewage treatment plants are constructed where land is available; however, laying sewers to carry untreated sewage to the treatment plant also remains a challenge. The treated sewage is then disposed as conveniently as possible, invariably into the nearest drain. We are also observing another trend where treated waste water, which is transported through official drains, is allowed to mix with untreated sewage, which then flows through unofficial open drains, adding to the pollution. Indian cities have the

option to devise interventions from scratch as very few sewerage networks exist. We can contemplate on building shorter length sewer lines, having decentralized treatment plants, and reuse of treated waste water and solid waste. We can save huge costs incurred in setting up a centralized waste water

treatment and use newer strategies involving less energy and chemical consumptions. Technologies are available; the will is needed. And this 'will' shall go a long way in sustainable water management if sprawling urbanization is to find water for itself.

## IN CONVERSATION



**Dr Arun Kansal, Head of Department and Professor, Department of Regional Water Studies**

1. Professor Kansal, you have been instrumental in setting up the Coca-Cola Department of Regional Water Studies, a TERI University–Coca-Cola India joint initiative. What was the inspiration behind setting up an independent Department for Water Studies?

**Arun Kansal (henceforth AK):** As you are already aware, TERI University was basically set up to offer courses and programmes centred around sustainable development that address problems of today as well as those of the future. Though water was being offered as a course or a module in these programmes even prior to setting up of this Department but the focus was more on water as a physical or an economic resource. However, the complexity of water demanded a more comprehensive programme, which also included the socio-cultural and politico-economic entity of it. We all know that water is closely interlinked with all the sixteen other sustainable development goals be it poverty, health, education, climate change, energy, etc., and addressing water issues would help in paving the way for achieving

these goals. Thus, grooming water leaders, engaging in public advocacy and providing adequate policy and decision making support to the government and other stakeholders were some of the objectives behind creating the Department of Regional Water Studies.

2. As the name suggests, this Department has been set up with the support of Coca-Cola India. How did your collaboration with Coca-Cola take place? What were the major challenges in setting up the Department?

**AK:** TERI University as an institution believes in linkages and collaboration with various stakeholders; industries being the most significant one when it comes to addressing various sustainable development issues. Coca-Cola, as a part of their mission, has always been supportive of organizing various activities to make society more vibrant by addressing the challenges that underpin sustainability. Coca-Cola India has been investing a huge amount of money towards programmes that create an impact on human society, even before this collaboration happened. Since past five years, they have been supporting school programmes for addressing sanitation and water supply issues in various schools located both in urban and rural areas of the country. Water being integral to their business they were also contemplating on building capacities in this field. This created a natural synergy between TERI University and Coca-Cola India and it led to the establishment of this Department.

3. What are the different courses, which the Department offers and how do you think these courses are different from the conventional programmes offered by other institutes?

**AK:** Most of the courses related to water, which are being offered in India and globally view water from a science and technology lens. Further, the management of water is also being done through institutions, which are predominantly male-dominated be it urban local bodies or government agencies or private organization despite water being a more gender sensitive commodity. The main reason behind engaging more men in management of water is the engineering centric approach that

is being adopted for solving water issues. The belief in bringing about a paradigm shift in this approach led to the Department offering Masters Programmes in Water Science and Governance taking into consideration the interdisciplinary and multidimensionality of water issues. The subjects range from science and technology to gender rights, governance, water law, water economics, etc., and even looks at integration of traditional knowledge with contemporary knowledge.

4. What are the possible career prospects for the students studying the programmes offered by the Department?

**AK:** The pedagogical approach of this programme is primarily project-based learning where students are made to understand the concepts through live projects, case studies, and interaction with working professionals and stakeholders. Sixty per cent of the learning happens on ground as the programme, which spans over two years has one full year dedicated to on the job training. The classroom lectures also cover cross-sectoral dimensions, which are a systematic amalgamation of engineering, social, economic, legal, governance, and other cross-cutting issues. Thus, the students of this programme have experience of working on the field and contributing to the development of water sector from day one and are adequately equipped to take up jobs in organizations ranging from corporate houses and government departments to NGOs and research institutions.

5. Besides the courses, what are the other ways in which the Department is reaching out to the youth of the country?

**AK:** Engaging with youth and encashing on India's most important asset- the demographic dividend remains a priority for TERI University and for the Department. We are always conscious of the fact that this demographic dividend may turn into a demographic disaster if not harnessed adequately. Thus we try to reach out to the youth of the country at various levels- schools and colleges. TERI University has recently set up a School-University Network (SUN) to create awareness among higher secondary school students on issues related to water, energy, waste, climate change etc. Our projects also have a training of trainers component wherein we train teachers on behavioural changes required for addressing issues related to water and sanitation.

This we believe has a force multiplier effect as these teachers in turn act as a catalyst of change when they pass on the message to their students. Likewise, we also conduct summer schools, competitions and several other events for college students. We have recently concluded a pan-India 'Inter-University National Water Competition' for undergraduate students. The competition was designed to create awareness and research interest amongst youth in the field of water and sanitation. We have recently come up with a Research Grant opportunity for the youth under USAID supported project the benefit of which can be availed both by undergraduate and post graduate students by submitting innovative proposals in the field of water.

6. You are currently steering several projects related to Urban Water Management and Sustainability in association with international agencies like USAID, ENEL Foundation, etc. Could you tell us something about these projects and their long-term contribution towards sustainability?

**AK:** It is one of the mandates of our Department to conduct action-based research, in conjunction with the government, donor agencies, and various other stakeholders and come up with policy recommendations, which can positively influence decisions related to management of water. The project supported by the ENEL Foundation is related to 'Urban Metabolism' for water supply planning. The majority of water supply in urban areas is planned by development agencies, wherein the demand is assessed based on population and per capita norms. However, there has been no study till date in India to assess the real demand of water in the urban areas. Through the urban metabolism study we are trying to look into the entire urban planning from the view of water demand management. We are trying to assess how urban development influences the hydrology of urban areas and how urban planning can make this hydrology conducive to work as a water supply catchment. Yet another project, which we are doing, is in association with Asia-Pacific Network on 'water- energy-carbon nexus', the emphasis of which is on inter-linkages between sectors and how the policy in one sector actually influences or modifies the objectives and goals of the other sector. The project, supported by USAID, is a large scale project with two broad components- capacity-building in water sanitation and hygiene

and health risk assessment in urban slums through gendered lens.

7. The fast pace of urbanization and industrialization has led to indiscriminate withdrawal of the groundwater as well and the situation in most of the regions, especially in the north-western part of India, is precarious. What, according to you, are the challenges associated with management of groundwater and how do you think this problem can be alleviated?

**AK:** My personal view is very different from what you have posed in the question. I would rather say that lack of balanced urbanization and industrialization has created problems with respect to groundwater stress and general water scarcity. I say this because agriculture has the major water allocation amounting to about 85–90 per cent of the total water usage but the productivity per unit area in India is very low vis-à-vis the consumption. I feel that there is a huge pressure on the rural land and the farmlands are also highly fragmented to enable penetration of efficient water technologies. In fact the pressure on land can reduce if the degree of urbanization and industrialization increase and there is more migration from rural to urban. It is unfair to blame the sector, which uses just about 10 per cent of the water for the entire water scarcity scenario. I feel land consolidation will help in the penetration of efficient technologies and hence, more water will be available to subserve other sectors of the economy.

8. 'Smart Water management should be at the core of most government plans like Smart City, Swachh Bharat Mission, etc.' What is your take on it?

**AK:** Smart water management cannot happen unless we recognize water as an economic commodity. Unlike all other resources, such as coal, minerals, etc., water despite being an essential economic resource has not gained the attention it deserves. So, we cannot think of smart water management unless the economic character of the water is well recognized. With this recognition, the water-use efficiency measures will automatically come into play the way it is in energy sector. So, what is required is a Bureau of Water Efficiency on similar lines as we have the Bureau of Energy Efficiency. But, all this would happen only when water is valued appropriately.

9. Water and energy systems are highly intertwined and an understanding of their interdependencies and nexus has become extremely important for water security as well as energy security. There are a host of studies, which have brought out the need for an integrated development of water and energy policies. However, practically, what are the various challenges associated with implementing it?

**AK:** One of the main challenges I see is that we do not have enough data and research done in the sector of water-energy nexus with respect to developing countries, particularly in India. If we look at the literature, most of the studies are done in parts of Australia, United States, and Europe, but when it comes to India, there is very little, which can be seen. We still do not have an established water and energy elasticity index to ascertain the impact of one on the other. Honestly, I am glad that in our University we have six PhD scholars, who are working in this field with different dimensions, such as micro-economics, urban context, agriculture, etc. I hope that in the coming years, we have enough evidence on the basis of which we can make recommendations on integration of these two highly interdependent sectors.

10. Consumerism in India has hit a new high and at the current pace, the growth is expected to be 25 to 30 per cent annually. The two major items most in demand are food and clothing; the water footprint of both being very high. What according to you should be done to bring change in the consumer behaviour and safeguard our freshwater ecosystem?

**AK:** It is like quoting something, which is easier, said than done but what is important is that people need information to make decisions and choices. For instance, to produce 1kg of red meat, we require about 14,000 litre of water and to produce 1kg of rice around 3,500 litre of water is required. What I wish to bring out is that there is inequitable consumption of water for producing either a food item or a product. Right now this information remains under the confines of the scientific community and it is time we bring it to the public by labelling the product also in terms of its energy footprint, water footprint, and environmental footprint. Unless the people have such information, we cannot think of bringing about any visible behavioural changes.

11. High-level growth rates in large cities along with unplanned or skewed city development has aggravated the possibility of flash floods in urban areas of India. What suggestions would you like to give to our urban planners to mitigate this problem?

**AK:** Urban forms and the entire urban planning influences the environment in multiple ways and though we have an urban planning department, the people in this department, are dominated by architects who conduct town planning from the viewpoint of demographic management. In the Fifth Intergovernmental Panel on Climate Change (IPCC) Report, there is a new chapter in Working Group 3 that is Chapter 12, wherein the influence on urban planning in various aspects and the kind of matrix, of decision-making, as required today is very well-established. In this context, we debate the vertical growth of cities wherein we have high rise buildings in multiple open spaces, which act as a buffer against storms and floods and also help in recharge of ground water as compared to an urban sprawl where there is a lot of horizontal growth. While on one side, a particular type of urban form may be good from the point of view of energy consideration on the other side another urban form

is useful from the viewpoint of disaster mitigation. So, the urban form choices are context specific and the choices can be made depending upon a given geographical conditions, the urban forms choices have to be made accordingly.

12. What is your sustainability message to the youth of this country?

**AK:** The youth, of the nation, are aware of the environmental problems and challenges that we face today. They have been taught about the basic principles of sustainable development, which includes 5Rs, namely recycle, reduce, recover, reuse, and reform. My message to the youth is that 'add one more R—Refuse to consume'. The youth should categorize their needs into essential, desirable, and luxury, and wherever possible try to minimize on use of items which are not essential.

13. Professor Kansal, with all these multiple engagements, how do you find time to relax and unwind?

**AK:** Relaxation, I believe is relative. For me relaxation is about passion for my profession and enjoying the work that I do.

# SUSTAINABILITY OF WATER RESOURCES: GETTING THE BASICS RIGHT

**Romit Sen, Deputy Director, Centre for International Projects Trust**

**W**ater is fundamental to our survival. Availability of water will determine how our country is able to sustain its agricultural and economic growth and at the same time provide the basic necessity to its citizens. However, it is becoming evident that availability of water is declining while demand is increasing. Numerous discourses, debates, and forums have reinforced the need to develop a new paradigm for water management in India. While there is a growing understanding of increasing water scarcity and pollution, the efforts towards governance and management of water resources in our country are disjointed. There are certain basic aspects that need to be looked into if we are to sustain our freshwater resources. Some of these include:

## **Comprehensive Assessment of Water Resources:**

The last time a comprehensive assessment of water resources for the entire country was done in 1999–2000 when the National Commission on Integrated Water Resources Development and Sub-Standing Committee of Ministry of Water Resources brought out figures on water availability, use, and future demand across various sectors. Thereafter, it has been a period of 15–16 years since an all India assessment has been undertaken. The planning of water resources needs to be based on updated data, and it is high time that the Central Government undertakes a complete assessment on water availability, use, and future demand for the country.

**Groundwater Management:** A large share of irrigation and drinking water needs is met by groundwater. Groundwater depletion has become a serious problem with aquifers across the country moving into over-exploited zone. In order to limit extraction, one needs to address the legal regime related to groundwater. Under the current legal regime, which dates back several decades, the landowner is given the right to capture an unlimited

amount of groundwater from beneath his/her land, without being liable for over extraction. A changed approach is required in making the State the custodian of groundwater resources. But how do we bring the large number of current groundwater users go through installed individual extraction units? This needs to be understood. As part of the Twelfth Five Year Plan, the Central Government has undertaken a programme for mapping the aquifers of India. This will help in development of aquifer management plans for better groundwater management.

Further, groundwater recharge can no longer be ignored. We need to take measures to store the high level of run-off presently not being captured by recharge and be used for augmentation of groundwater resources. There are examples of groundwater management programmes across various states where participatory mapping of groundwater resources, water budgeting, and community controls have resulted in recharge of aquifers and augmenting the source of water for people.

**Water Pricing:** Water has economic value in all its uses and thus should be recognized as an economic good, and therefore, suitable pricing mechanisms need to be developed. Pricing for water has always been a politically sensitive issue, but it is high time that we recognize the need to bring financial stability for our water utilities. Pricing should be looked upon as a critical input for activities such as agriculture, industry, and domestic and as a means of increasing the financial stability of water projects, which do not exclude the provision of water for the poor and marginalized.

**Improving Water Use Efficiency:** Improving water use efficiency is the need of the hour and is crucial for reducing dependence on freshwater sources. Agriculture accounts for more than

80 per cent of the total water use, and therefore resource optimization in this sector is vital. Water use efficiency in agriculture can be brought about by low-cost technologies that are not resource intensive and at the same time have the potential to save a lot of freshwater. It is also important that measures for bringing efficiency in the urban and industrial sector are brought about. The National Water Mission, which is one of the nine missions set up under the National Action Plan for Climate Change under the Prime Minister's Office, has a goal of increasing water use efficiency by 20 per cent across all sectors. There was a proposal to set up a Bureau of Water Use Efficiency (BWUE) but the institution has not seen the light of the day. One has seen the positive impact of the Bureau of Energy Efficiency (BEE) in energy conservation, and it is time that the government considers setting up BWUE.

**Controlling Pollution:** Water pollution is a growing crisis having an impact on human health and economy. Pollution mitigation will require a mix of technological, financial, institutional, and social measures. To begin with, it is of utmost importance to increase the number of pollution monitoring sites in the country. This will enable better data collection and help in devising appropriate mitigation strategies for pollution control. Water pollution is a burden on our economy and our environment. There are a large number of studies being conducted for estimation of cost of health burden due to water pollution, but in all the prior studies, the cost of health burden has been estimated for domestic pollution. The estimation of health burden due to industrial pollution is missing in all the earlier studies. There is a need to estimate the economic burden of industrial pollution on human health and to find out the cost for pollution abatement.

**Dual Water Supply System:** To reduce the burden on fresh water sources, the option of dual water system is being worked out in several parts of the country. The success of this system lies in the fact that filtered purified water is used only for drinking/ domestic purposes while other sources of water may be used for purposes other than drinking. This is also a cost-saving measure as resources spent on providing clean water is saved by using alternate sources. While there are counter arguments to indicate that creating such a system would mean incurring additional cost on developing new infrastructure; however, if one looks at the cost of treating water and its wastage across non-potable uses, the gains of having a dual water system would seem logical and a forward looking measure.

**Incentives and penalty:** Developing methods to incentivize conservation and penalize wastage can encourage judicious use of water. Incentives can be provided to communities, utilities, states, and industry associations that have gone in for water harvesting and conservation measures. Incentives can be in form of priority and speedy implementation of development works and schemes, relief in taxes, etc. The principle of penalty is to prevent wastage of the resource. It may consist of charging one price per unit for the use of small amounts of water and raising the price per unit for the use of larger amounts of water. Penalties can be levied on panchayats, urban local bodies, resident welfare associations, and industrial units for polluting water resources and wastage.

Finally, we will never be able to realize the goal of saving our water resources until and unless every user of water sees a role for himself/herself in this mission. Availability of safe and assured water is too important for each one of us to be left for someone else to act.

# MANAGING WATER AND CLIMATE CHANGE RISKS: AN ALARMING CHALLENGE FACING INDIA'S WATER SECURITY

**Rudresh Sugam, Researcher, Council of Energy, Environment and Water (CEEW)**

Climate change is real, whether it is human induced or natural, and its impact on the environment and human are yet to be completely measured. However, the findings of the Fifth Assessment Report of the IPCC, that human influence has been the dominant cause of the observed warming since the mid-20th century is alarming. The report also found that Asia region as a whole experienced the most weather and climate-related disasters in the world between 2000 and 2008 and suffered the second highest proportion (almost 30 per cent) of total global economic losses. Change in monsoon patterns will have huge implications on water resources and associated systems, such as agriculture, which makes India even more vulnerable as we have nearly 70 per cent population (large share of small and marginal farmers) relying on agriculture for livelihood (World Bank) and nearly two-third of the cultivated land is rain-fed (Water Statistics, CWC). Cases of crop failures, farmer suicides, and booming water tanker industries could now be seen in several states in India, which clearly illustrates negative impacts of climate change on water security. If we quickly assess some water-related statistics for India, we would understand why it is critical to start acting immediately.

The total available water resources in India is around 4,000 BCM of which only 1,123 BCM, that is, 28 per cent is utilizable. If there is a temporal and spatial variation in monsoon, which is already being experienced, the utilizable water resources would further decline. If we see sector-wise consumption of water, irrigation consumes more than 80 per cent, with few states already extracting more

ground water than the amount that is naturally replenished leading to severe fall in water levels. Moreover, irrigation efficiency is low with an average irrigation efficiency of 50 per cent and 70 per cent for the surface water and ground water, respectively. The demand from residential and industrial sector is ever increasing; the per capita water availability has decreased rapidly from 5,200 m<sup>3</sup> in 1951 to 1,588 m<sup>3</sup> in 2010. Only 70 per cent households in urban areas receive water within the premises and nearly 60 per cent receive tap water from treated sources, the situation in rural areas is worse. Even in this situation, the non-revenue water (unaccounted water loss due to leakage and theft) is as high as 90 per cent in some places; on an average across 28 cities, it was estimated to be 39 per cent. In addition, traditional water bodies (ponds, tanks, lakes, etc.) that are not only sources of water but bury more carbon than all the world's oceans combined, are in abysmal state.

Challenges are many and so are the opportunities, a multi-dimensional and integrated approach is required to address these challenges. The first and foremost step is to develop better data and robust hydrological information system for developing precise information about the resource availability and planning accordingly. Thus, in addition to knowing the quantity, assessing water quality becomes crucial for decision making. At the national level, centralized organizations, such as Central Water Commission, Central Pollution Control Board, Central Ground Water Board, etc., are collecting data but more effort is required at the local levels. Another concern is about the accessibility and usability of the data. Historically, communities in

\* The article was published in Centre for Policy Research's (CPR) Newsletter *SARCist*. Available at: <<http://thesarcist.org/Opinion/124>>.

India managed water and each community had a unique way of doing it. Unfortunately, we don't have all the records but those systems should be studied and revived utilizing local wisdom. Practice of local/community level information collection is important and best practices, such as Andhra Pradesh Farmer Managed Groundwater Systems, where farmers collect water data and mutually agree on the cropping pattern have to be replicated.

In agriculture sector, practices such as system of crop intensification, drip irrigation, sprinkler irrigation, and change in cropping schedule and pattern could do wonders. However, recommending farmers without hearing them would be incorrect, as the practices they have developed are based on hundreds of years of trial and error on field. Therefore, neo-traditional agriculture practices could be the right way to address water security and climate change concerns.

In urban areas, the problem of leakage and theft and usage pattern could be sorted out/understood by better operation and management (O&M) and monitoring systems, such as Supervisory Control and Data Acquisition, but it would require financial support. While discussing nature of water as a resource, the following question arises: Is it a social good or an economic good? The politics around this question has been played for long but now it's time to put a price on water. Unquestionably, minimum threshold for meeting basic needs can be

kept free but anything above that should be priced rationally. Providing subsidy is not helping much as it majorly targets the urban poor, but several research works have found that poor end up paying the highest price for water.

On supply side, 80 per cent of supplied water comes out as waste water, which is huge and therefore has to be treated as a resource. Currently, there is wide gap between sewage generation (57,000 MLD [million litres per day]) and treatment capacity (20,358 MLD) and most plants are spatially unevenly distributed and not working at full capacity. This results in high scale pollution of fresh water sources impacting health and environment. From waste water, in addition to water recovery, nitrogen and phosphorus fertilizers, and energy from sludge can be recovered and reused in the form of heat, electricity or biofuels. All these require systemic changes, and learnings from Singapore, Israel, California, etc., can be adopted to follow a circular economy pathway for addressing water security concerns in urban regions of India.

Finally, connecting global goals, such as SDGs to local level is necessary. Penetration and understanding of these goals is poor at the local level. Therefore, policies and regulations at local level will have to ensure that the local goals are aligned with the global goals. Building a climate-resilient and water secure country is not possible without collective action, especially users' participation in decision making is vital.

# TRAGEDY OF THE COMMONS IN THE MAKING? MANAGEMENT OF TUNA STOCKS IN THE INDIAN OCEAN

**Tobias Belschner, International Exchange Programme Student, TERI University**

Tunas are among the most valuable fish species on the earth. In 2013, a Tokyo-based Sushi chain paid the record price of USD1.76 million for 222 kilo Bluefin Tuna. The Indian Ocean is home to various valuable tuna species: In terms of quantity of catches, Yellowfin and Skipjack tuna are the most important. Tunas are highly migratory fish that cross large distances. No single country can regulate 'its' tuna stock since tunas frequently move from one country's maritime zone to the next. International cooperation is thus required to manage tunas. In the Indian Ocean, the Indian Ocean Tuna Commission (IOTC) is the relevant institution that organizes cooperation between countries fishing for tunas; the most important countries being Indonesia, India, Spain, Sri Lanka, Maldives, and Iran.

In almost all regions of the world, attempts to prevent or halt overfishing of trans-boundary fish stocks like tunas have been little successful. One notorious example is the collapse of cod stock off the Canadian coast in 1992. The stock had been fished for centuries but ever more efficient fishing techniques led to overfishing and finally to the sudden collapse of the stock.

Most tuna stocks in the Indian Ocean presently seem to be able to sustain the fishing pressure to which they are exposed, although high-quality data on the state of stocks are lacking. What is clear, however, is that the current institutional framework to manage the tuna stocks is not sufficient to halt overfishing once it occurs. The experience from fisheries in other regions of the world suggests that it is only a matter of time when this will be the case.

A 2009 review of the IOTC conducted by a legal expert, a scientific expert, the representatives of six IOTC member states, and an NGO observer highlighted various weaknesses of the institutional framework. It recommended a thorough reform of the IOTC's institutional framework, which has not been changed since its creation in 1993 and therefore does not incorporate current principles of fisheries governance such as ecosystem-based management and the precautionary approach.

The report noted that compliance of member states with IOTC measures is low and that the IOTC's provisions for monitoring compliance by member states and for sanctioning non-compliance are insufficient. Measures taken since 2009 to address the weaknesses of the IOTC seem insufficient: The treaty underlying IOTC has not been reformed and parties were unable to agree on important monitoring mechanisms, such as a centralized boarding and inspection scheme and a system, for sanctioning non-compliance by member states.

The experience of fisheries management in other world regions and especially in Europe shows that the weaknesses of the IOTC will need to be addressed in order to manage tuna fisheries in the Indian Ocean sustainably. European states started cooperating on fisheries already at the end of the nineteenth century but were unable to bring about sustainable fisheries management until around 2005—over 100 years later. Many fish stocks in the waters of European Union (EU) member states were severely depleted and have only recently started to be rebuilt. The strengthening of the system for detecting and sanctioning non-compliance has been central to the EU's turn towards more sustainable fisheries management: In 2005, the European Court of Justice imposed a 20 million Euro fine on France for breaking EU fisheries laws plus a 57.8 million Euro penalty for every six months in which breaches of EU fisheries law continued. Also in 2005, the European Fisheries Control Agency was created, which serves as a centralized monitoring agency in European fisheries.

Against the backdrop of the history of fisheries management in Europe, the weak institutional framework governing the management of tuna stocks in the Indian Ocean is worrying. Tuna stocks may be stable at the moment, yet the IOTC seems ill prepared for stopping overfishing once it occurs. Unless investments in the regulatory institutions are made, investments in fishing fleets are unlikely to pay off.

# WATER MANAGEMENT: A TECHNOLOGICAL INITIATIVE

Mohd Zeeshan, MTech, Water Science and Governance, TERI University

Water shortages have become a constant challenge in several regions of India. Many states are confronted with problems associated with inadequate supply of drinking water and wastewater management. More than half of the world's population will suffer from water shortages if this problem is not dealt with. Each year, more than 35–40 per cent of treated water is wasted before it arrives at homes and facilities. This loss happens when the cracks appear in the pipeline network because of weather changes, ageing infrastructure, and construction mistakes. These leaks are easy to spot because water bubbles out to the surface of the street. But it can be harder to detect smaller leaks in underground water lines beneath the roadways and concrete structures. Small leaks have the potential to turn into expensive and dangerous outcomes if not detected and stopped in time. Over the last few decades, water stress has been increasing both due to an increase in water demand and reduced water supply, which makes leakage reduction in water systems a crucial part of water demand management.

In an analytical study conducted by the Delhi Committee of the Associated Chambers of Commerce and Industry of India, has revealed 'distribution losses are primarily due to leakages in a network of nearly 9,000-km-long water supply lines and because of theft committed in unauthorized connections with results in supply–demand gap of around 1300 million litre of water in Delhi. And this added the woe in summer, when the demand rises in several regions. The mismanagement and poor maintenance of the network made the situation more critical.'

Leakage is usually the largest component of distribution loss, but it remains unregulated. In public water supply systems, it results in not only loss of purified drinking water but also wastage of energy and material resources used in planning,

distribution, and treatment. Subsequently, it leads to secondary economic loss as well like damage to the pipe network, public health as it increases the risk of bacterial contamination of water delivered in cities for human consumption, and can increase pollution loads into the environment. With the growing population demand, it makes the situation worse for the current ageing infrastructure as it will put undue pressure on the network. The pipeline network beneath our streets needs to be replaced because with aging of the pipes, the problems of infiltration and exfiltration due to leaks can lead to potential problems such as collapse of a pipeline network or damage the nearby assets. With extensive improvements in Information and Communication Technology (ICT) sector, potential exists to make fundamental difference in the monitoring of water losses through leaks and unauthorized tapping from the network. ICT is recognized as a strategic ally in the process of developing innovative solutions to address the problems of water scarcities as well as providing real-time information to the authorities, which facilitates them with inputs for better action. Earlier, the water sector was confined in traditional solutions that make detection of leaks and thefts from the deep pipeline under the ground a difficult process. The operator uses microphones to listen for the water escaping sound from pipe which anyway is an imprecise and time-consuming process.

The short-term and long-term sustainable management of water resources requires new and innovative thinking. Technological innovation in the water sector could bring a series of benefits, ranging from conservation to the recycling or reusing the water resource. Developments in the area of sensors and nanotechnologies could lead to incorporation of these technologies in the water pipes network. These sensors could be remotely monitored to provide information about the state of

the pipe and allow water management authorities to take proactive action on problems detected on the distribution network and better control over assets. The outcome from this ICT tool will be a system that helps to manage end-to-end distribution in the water supply network. For water authorities, the capability to be able to identify leaks or carry out repairs on the water distribution network in near real-time basis will be crucial.

It is clear that availability of accessible water supplies in India is likely to come under intense pressure over the next couple of decades as its anticipated demographic transition and industrialization places stress on current sources of water supply. So, a well-designed ICT systems not only allows best use and deployment of water

management systems but also draws millions of individual stakeholders around the country, thereby maximizing water-use efficiencies nationally that leads to a better understanding of water sector, which will eventually influence the society and provide accessible data for rational decision making to the policy makers. The use of ICT in the water sector will increase the water efficiency with significant savings in energy, finance, and chemical and maintenance costs for the water network. Therefore, a combination of digital and field measures to effectively increase water-use efficiency across the country could be used, which would at the same time help in capacity development to encourage responsible usage of available water resources.

# MILES THAT WATER TRAVELS TO REACH CITIES

Priyank Jain, MTech, Water Science and Governance, TERI University

It is all too easy to have a glass of clean water and not think from where it comes. Of course in cities, and now in many villages as well, water comes through tap and that's it. Well, in India, it is a very recent phenomenon. Still, tap is just the medium, water comes from elsewhere. Yes! It comes from water treatment plants (WTPs), where potable water is 'produced'. Naturally, we are interested in potable water only. In almost all metropolitan Indian cities, the distance water travels is not just between the WTP and the household tap but much more. It is anywhere around hundred kilometres and even more in some cases.

Delhi, the capital city, with its more than 10 million population virtually represents India, has very interesting arrangements of water planning and management. Half of its water comes from the River Ganges and Bhakra storage. The distance which water travels in this case is above 200 km to just to reach the city's boundaries, and the spread of Delhi is 1,483 sq.km. Almost, one-third of its water comes from the River Yamuna, but not from stretch which flows along the city. This water comes from a barrage upstream and travels nearly 100 km. The remaining demand of Delhi is fulfilled by groundwater, which apparently travels very less, few tens of metres, couple of hundred sometimes. But, those who have any idea about aquifers and the sub-surface flow of water, they would know that groundwater too flows, although at a rate very less than of surface water, but it flows in scales of distance, dimension, and time.

On reaching the city's boundaries, it is treated and further produced to be fit for human consumption, only to later become unfit again. The produced water in Delhi travels through the complex network of pipelines, which are 11,350 km long. And, there are people who manage this and keep the system running smoothly. Not, just water, even the sewage

travels several thousand kilometres. And, this too is managed and runs smoothly.

Unearthing this flow of water and network of pipelines is necessary. This is because we must acknowledge the kind of effort that goes into providing us with a glass of clean drinking water and what would the consequences be if no such system exists. And, thus there are many debates around water pricing, efficiency, cost recovery, source augmentation, etc. But, one must observe the scale of operation and centralization in the system. A small failure in one unit of the WTP would result in loss of water supply to more than half of the city for that day. This raises the question: Is smaller, decentralized, and less complex systems possible?

The answer lies in reducing the 'number of miles' that water travels to reach the city. We must start thinking towards exploring and creating resources of water within the city's boundaries. It is not easy, and it cannot be. It involves many factors. But, it is doable. The resources are available, the design and technologies are available, and most importantly, the successful examples are also available. Recycling and reusing waste water is one such example. Storm water is a wonderful resource, which Indian cities have failed to tap. Although, rainwater harvesting has been encouraged and enforced, but the harm due to loss of lakes and wetlands is manifold than what harvesting can compensate for. Groundwater is a perennial source of water, but it is lowering not just because of over-exploitation but faulty land-use planning and practices. Delhi metro has come as devastation for the aquifers.

Now, that focus of researchers is shifting towards designing water sensitive cities, I am sure some solution would appear soon. Also, water is not just that which is produced and we drink. It is more than that—rains, rivers, lakes, wetlands, aquifers, ocean, soil moisture is also water.

# EVENTS

## 1. Onam Celebrations at TU

September 1, 2015

Onam is a traditional Hindu ten-day harvest festival celebrated in Kerala marking the homecoming of the mythical King Mahabali. The students of TERI University celebrated Onam in the campus on September 1, 2015. They were dressed in their traditional attire and one of them was dressed as King Mahabali. Mr Amit Kumar, Dean, Distance and Short-term Education, TERI University inaugurated the event and addressed the students. There was music, a swing, and beautiful floral rangoli also known as Onam Pookalam made by the students. In the end payasam (kheer) was served to all.



## 2. Fresher's Party

September 4, 2015

Students of the TERI University organized a fresher's party on September 4, 2015 to welcome the newcomers. The party was a fun-filled affair where juniors were informally introduced to the TU spirit by their seniors. The event saw the crowning of Mr and Ms Fresher and the winners of music and dance competitions gave spectacular performances, which were held prior to the event. The event concluded with an equally rocking DJ night and with delectable snacks served to all.



### 3. Rangoli Competition

November 2, 2015

As a precursor to the Ethnic Day celebrations on campus and Diwali, a Rangoli competition was organized on November 2, 2015. Students drew traditional designs of birds, flowers, and other patterns. The colour combinations used by the Rangoli contestants were exquisite, catchy, and vibrant. It was a day of fun and excitement as several students from the various departments got together to show their creative skills. Five teams participated in the event. The competition was judged by the Pro-Vice Chancellor of TERI University and a jury of three faculty members. The top three winners were later awarded certificates on November 3, 2015 during the prize distribution ceremony on Ethnic Day.



### 4. Ethnic Day

November 3, 2015

Students of the TERI University celebrated Ethnic Day with great zest and joy on November 3, 2015. The Ethnic Day started with the prize distribution ceremony to felicitate the winners of Sports Meet 2015 and Rangoli competition. Later in the evening, several students participated in an Ethnic Walk wearing their traditional clothes followed by bhangara, a Punjabi folk dance, a musical performance, and poetry recitation. The event concluded with dance and a DJ party. It was a fun-filled day with lot of joy and excitement amongst students.



## 5. Farewell Party

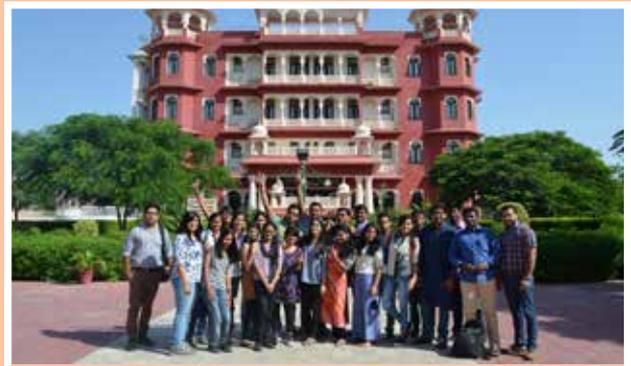
November 20, 2015

First year students of the TERI University bid farewell to the outgoing students on November 20, 2015 with nostalgia. It was an occasion for the outgoing students to look back at time that they spent in campus and the education that they acquired during the period. First year students organized a variety of dance and musical performances and a video showcasing the journey of their seniors in TU. Later they awarded their seniors with different titles. The programme concluded with dance, food, and DJ night.



## FIELD TRIPS

TERI University believes in imparting experiential learning in addition to traditional classroom teaching methods to its students. Every year, it regularly organizes very informative and educative field trips for students to learn from outdoor settings.





## AWARDS



1. **Ms Shobhana Jha** and **Ms Brototi Roy**, students of MSc Economics, TERI University won the NISTADS-INSEE award and a cash price of ₹5,000 for the two best articles published in the popular media (newspaper or magazines) on the growth-green growth-degrowth issues. They had participated in the Symposium 'Growth, Green Growth or Degrowth: New Critical Directions for India's Sustainability' organized by INSEE, TERI University and NISTADS at the India Habitat Centre, New Delhi on 12–13 September 2014. But they received their awards in January 2016.



2. **Dr Shivakshi Jasrotia**, alumni, TERI University won the First Place in Energy Development 'Best Innovation Project' at the First BRICS-EAEU forum 2015. The International Youth Forum on Science and Innovation of BRICS and EAEU was hosted in Moscow from 28–30 October 2015. The event was attended by delegations from Brazil, China, South Africa, Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia. During the Forum, the participants presented their innovative projects in four key areas of energy, medicine, and health, IT, and agriculture. The innovation challenge was judged for innovative idea, innovative product, and innovative project.



3. **Mr Sahil Singh Kapoor**, Student, MTech Urban Development and Management programme received certificate from Emily White, Director, The American Center Programme, Mrs Karuna Singh, Director, Earth Day Network India, Shri Kartikeya Sarabhai, Director, CEE and Madhavi Joshi, Director, Youth Programmes-CEE, at the South-Asia Youth Environment Conclave, held from 29–30 September 2015 at the American Center, New Delhi.



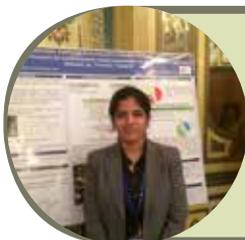
4. **Mr Mohd Zeeshan**, a 3rd Semester student of MTech, Water Science and Governance, secured the First position in Research Poster Presentation during SWASH 2015 inter-university event organized by Water Studies Department. The topic of his research poster was 'Smart Water Leak Detection System.'

## ACHIEVEMENTS



- 1 **Mr Sahil Singh Kapoor**, student, MTech Urban Development and Management programme served as Climate Solutions Coordinator, Delhi–NCR from July–December 2015 in India Youth Climate Network (IYCN). He is currently serving as a trained Climate Reality Leader of 'The Climate Reality Project 2015' focussing on understanding and responding to climate change in India through public outreach for community involvement.

2. **Mr Sukrit Joshi; Ms Garima; Mr Payai Mayonk John; Ms Trinayana Kaushik**, students, MSc Climate Science and Policy undertook a Project on 'Calculation of Carbon Footprint of TERI University.' Emissions from various sources, such as company-owned vehicles, DG sets, kitchen fuel, grid electricity, self-owned vehicles, public transport (bus, auto, taxi, metro), paper used, and waste were studied in the Project. The Project was completed on November 20, 2015 and a detailed report was submitted to the TERI University.



3. **Ms Shailly Jaiswal**, PhD scholar, Department of Natural Resources, received DST funding for participation in the Symposium on Glaciology in High Mountain Asia in Nepal and ICIMOD and IGS funding for travel support.



4. **Ms Shivakshi Jasrotia**, PhD scholar, Department of Energy and Environment, successfully defended her thesis and was awarded PhD degree on September 7, 2015. The topic of her thesis was 'Studies on a Decentralized, Solar Energy-based Water Supply and Sanitation System for Arsenic Affected Rural Areas'.

Name of the Student	Name of the Event	Date and Place	Brief Description
<b>Mr Sahil Singh Kapoor</b>  MTech, Urban Development and Management	International Conference on Smart Cities	22–23 January 2016 The event was held at the Department of Management Studies, Indian Institute of Technology, New Delhi.	Sahil Kapoor presented a research paper on 'Self Sustainable Integrated Township: A Resource Base Planning to Improve the Quality of Urban Life.'
	Recent Advancement in Civil and Environmental Engineering	28–29 November 2015 at Civil Engineering Department, BRCM College of Engineering and Technology, Bhiwani, Haryana	Presented a paper on "A Paradigm Shift for Integrated Solid Waste Management: A Case Study of National Capital Territory of Delhi".
	International Conference on Sustainable and Inclusive Urban Development in India	1–3 August 2015 at India International Centre (IIC), New Delhi	Participated in the event.
<b>Ms Shailly Jaiswal</b>  PhD scholar, Department of Natural resources	Conference on Strategic Dialogue on Conservation of Himalayan Glacier	September 28, 2015 at IIC, New Delhi	Co-presenter with Dr S Tayal in the session Climate Change, Glacial Retreat and Livelihood, Assess Regionally, Act Locally.
	Symposium on Glaciology in High Mountain Asia	1–6 March 2015 in Kathmandu, Nepal	Presented poster on 'Analysis of Baseline Scenario for Socio-economic Impact Assessment Due to Variability in Melt Water'.
<b>Ms Deepali Vaish</b>  MSc Economics		October 31 – November 1, 2015 at Jawaharlal Nehru University	Presented her master's dissertation, "Understanding the Domestic Market of Organic Foods: Analyzing Consumers' Perspective on Soil Health and Willingness to Pay for Organic Foods in Delhi. Her thesis got published in the Journal of Agricultural Engineering and Food Technology.
	Conference on Role of CSR in Rural Development Sector organized by the Ministry of Rural Development and CSR Research Foundation.	February 2015. Event organized by the Ministry of Rural Development and CSR Research Foundation.	Participated as a Master of Ceremony.

<p><b>Ms Pratima Singh</b></p>  <p>PhD scholar, Department of Natural Resources</p>	<p>Workshop on Sustainable Water Resource Management: Perspectives from Europe and South Asia</p>	<p>28–29 September 2015 at German House for Research and Innovation, DWIH, Delhi.</p>	<p>Presented her work on 'Comparing Energy Intensity of Sewage Treatment Options in India and UK'</p>
<p><b>Ms Pratiksha Jain</b></p>  <p>PhD scholar, Department of Bioresources and Biotechnology</p>	<p>8th International Conference on Sustainable Energy and Environmental Protection (SEEP)</p>	<p>11–14 August 2015 at UWS Paisley Campus, Scotland</p>	<p>Presented her work on 'Electrochemical Treatment of Produced Water for Sulfide Removal'.</p>
<p><b>Ms Kanika Joshi</b></p>  <p>MA Sustainable Development Practices</p>	<p>11th Conference of Youth (COY11)</p>	<p>26–28 November 2015, Paris</p>	<p>Participated in the 11th Conference of Youth (COY11) held at Parc des Exposition in Paris. She was offered a position of Project Officer for the Solutions Team in the Sustainable Development Solution Network-Youth (SDSN-Y) Assembly. She will be working on project management and documentation of Youth Entrepreneurs for Development (YE4D).</p>

# SUCCESS STORIES

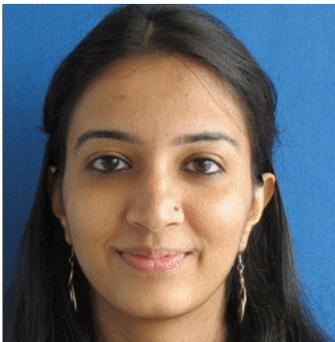
## Students' Startups



1. **Rohit Sadaphal**, alumni, MTech Urban Development and Management programme (2015 batch), TERI University, is now, Director, Econirmitee, which he started a year ago. Along with two alumni of the TERI University, Rohit started his enterprise to help solve waste management issues of the country. Econirmitee, intends to bring in a culture of decentralized scientific waste processing units for local level waste management. It has started an impact-assessment of poor waste management in the Hinjewadi area of Pune. Econirmitee plans for the bio-methanation process of waste, i.e., recovering methane gas from organic waste. Segregation of waste and processing will also be done. The focus areas of Econirmitee are waste generated at construction and demolition sites, floral waste, organic waste, landfill gas, and carbon emissions from industries. Details available at: <http://www.iamin.in/en/pune/news/pune-start-spreads-awareness-about-waste-segregation-71798>.



2. **Akhil Sood** did his MBA in Infrastructure in 2014. He is now a successful entrepreneur and is the Founder of KARMABHOOMI, an open society that uses innovative ideas of Buddhist economics and karma-centric approaches to solve various socio-economic problems in the villages of the country. They have successfully conducted solution-based development projects in places like Ladakh and Turtuk (J&K).



3. **Divakshi Nayar** did her MA in Sustainable Development Practice in 2013. She is now successfully running her own enterprise by the name Hope Collective, an e-commerce marketplace for unique products made by NGOs and social enterprises supporting a variety of causes. The venture aims to develop social entrepreneurship and reduce dependence of NGOs on funding by charity.

# ACHIEVEMENTS



1. **Romit Sen**, alumni, MSc Natural Resources Management (2003–05 batch) was invited by Lok Sabha TV as a panellist in their programme—Astitva. The topic of discussion was Water Challenges in India. The programme was aired in Hindi Bin Pani Sab Soon on January 30, 2016.



2. **Devpreet Singh**, alumni, MA Public Policy and Sustainable Development (2008–10 batch) who is currently pursuing her PhD from TERI University was nominated as the new CBI spokesperson in August 2015.



3. **Rudresh Kumar Sugam**, alumni, MSc Water Resource Management (2008–10 batch) works as Researcher at the Council of Energy, Environment and Water (CEEW). Recently his article on 'Managing Water and Climate Change Risks: An Alarming Challenge Facing India's Water Security' got published in Centre for Policy Research's (CPR) Newsletter called SARCist. Available at: <<http://thesarcist.org/Opinion/124>>.



4. **Preeti Aggarwal**, alumni, TERI University participated in 2015 ProSPER.Net Leadership Programme, conducted by UNU-IAS, at Universiti Malaysia Sabah, Malaysia, between 22–30 August, 2015. She has also published an article on 'Transformational Leadership and Sustainability Projects: Learnings from Malaysia'. Available at: <<http://prospernet.ias.unu.edu/news/transformational-leadership-and-sustainability-projects-learnings-from-malaysia-4036.html>>.



5. **Dinakar Peri**, TU alumnus, MBA in Business Sustainability (2011–13 batch), currently a Defense Correspondent with the Hindu wrote on Siachen Glaciers in October 2015. For more details you may read Siachen Diaries: The Civilian Trek available at <<http://www.thehindu.com/thread/politics-and-policy/article7747386.ece>>.



6. **Sonia Grover**, a TERI University alumna, MSc Water Resource Management (2007–09 batch) is currently working as Associate Fellow and Area Convener of Water Resources and Policy Management Area, Water Resources Division of TERI. She is also pursuing PhD from TERI University. During the course of her professional career, Sonia was selected as one of the two young emerging leaders from India for the Asia-Pacific Leadership Programme on Environment for Sustainable Development conducted by UNEP and Tongji University, Shanghai. She was also selected as one of the four young members from India for Asia-Pacific Youth Forum on Climate Actions and Mountain Issues organized by ICIMOD.

## Book Your Calendar for our Forthcoming Events

Sl No.	Name of the Event	Date
1.	BIOTIKOS: National Symposium on Nanobiotechnology	March 31–April 1, 2016
2.	SWASH: InSOULs of WE-In Search of Urban Leaders of Water and Environment	April 6, 2016
3.	Two-day Workshop on Qualitative Research Methods for Interdisciplinary Research	7–8 April 2016
4.	BLISS School 2016: Sustainable Consumption and Production Patterns	18–22 April 2016
5.	National Symposium on Geogenic Contamination of Groundwater: Its Impact and Mitigation Strategies	April 22, 2016

## About TERI University

The TERI University was established to disseminate the vast reservoir of knowledge devised by The Energy and Resources Institute (TERI), a not-for-profit, independent research institute recognized globally for its contribution to scientific and policy research in the realms of energy, environment, and sustainable development. The TERI University's academic offering is rooted in the comprehensive research, consultancy, and outreach activities of TERI.

In 1999, the University was granted the 'Deemed to be University' status by the University Grants Commission (UGC) and notified vide the Ministry of Human Resources Development, Department of Education, Government of India, notification no. F.9/19/95-U-3, dated October 5, 1999. Since its inception, the TERI University has offered not just world-class education, but also an environment that enables its students to develop fresh perspective in their subject areas. Before moving to Vasant Kunj, the University was housed in the Darbari Seth Block of India Habitat Centre from 1998 to 2008. In 2008, the TERI University started functioning from its new 'green campus', located in Vasant Kunj.

The University aspires to be an institution of advance learning, which meets the needs of a rapidly growing India. The academic programmes are envisioned to provide the students with a holistic perspective of the subjects offered and encourage interdisciplinary learning.

The TERI University aspires to contribute globally by serving society as a seat of advanced learning and to promote learning through teaching and through creating and sharing knowledge. The University commits itself to academic excellence and an environment, which would encourage personal and intellectual growth.

The TERI University provides world-class facilities and resources to its students and faculty so as to usher innovative and multidisciplinary research.



**For more information, please contact.**

### **The Registrar**

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