CSE

2016-2017

ANNUAL REPORT

KNOWLEDGE BASED ACTIVISM

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t is 25 years since the world signed the Earth Charter, signaling the importance of environmental issues at the global stage; it is 25 years since the setting up of the World Trade Organisation, signaling that commerce in the now inter-connected world would bring prosperity. 25 years ago, it seems was the moment of innocence. It was the age of hope. Then the issues of poverty, injustice; African debt; were all on the world's agenda. It seemed, bumps, blips included, it would be all right. Now, 25 years later, it seems the agenda has unraveled. The world has come unstuck. We know that today. From weird weather because of climate change to acute agrarian distress because of development policies, it seems that everything must start again.

What is clear is that the most dominant determinant of our future's survival will be our ability to mitigate and to cope with changing climate. There is no doubt already today weather is more variable, extreme and horrendously devastating for the poorest, who live on the margins of subsistence. It is they who today face the intense heat waves; the floods, the droughts and lose their crops and livelihoods to freak weather events.

There are no full-stops. Humankind continues to pump vast quantities of greenhouse gas emissions into the atmosphere. What will happen tomorrow and the day after? Scientific models are most unprepared when temperatures will cross 2° C increase over pre-industrial era. So, quite simply we are moving towards an age of extreme uncertainty. The Planetary limits are being breached. In this scenario, nobody knows what the future will bring. This is why coping and combatting climate change will be our overwhelming task. How we do this is literally in our hands.

Today we are getting richer but with huge strains of inequality and the mess of garbage, air and water pollution and its resultant health problems. We cannot believe that we can switch on our air purifiers and be safe. No closed windows will work here. The fact, is that we don't have the luxury of believing that we can get rich and then clean up. The technologies and methods of clean-up have been invented in a world, which made a business out of pollution. It was profitable to clean rivers or cities. But this meant that the cost of economic growth increased. It also meant that inequity increased. We don't have this option. We have the challenge of affordable growth and only then can it be sustainable.

Our question today, to secure future's future has to be about the use of technological advances so that it meets needs of all and of sustainability. Right now, we are not getting this right. We, like bystanders, are witnessing technology over-take our lives and livelihoods. Automation and artificial intelligence is driving changes in the ways we do things. But not with any big purpose. There is no discussion what this technology change will mean for employment. There is no discussion what and how these advances can be used to meet the needs of all and not just some.

This raises the very real question about the 'nature' of democracy. It is important to rethink the question of states, market and society. We have dismembered the state; grown the market and believed that we have empowered society. We believed that people would be modulating voices over market. They were the check. But we forgot to ask – which society is being empowered and for what? And so slowly, the circles closed – state-market and aspiring consuming society merged. Became one. Anyone outside this circle stopped getting counted. They are being slowly erased. This cannot work.

There is a need to think of the most important principle of environmentalism. Not in my backyard -- NIMBY. The question is if the NIMBY of the poor, whose backyard was used as the environmental dump – from garbage to carbon dioxide – can be empowered enough to say, enough is enough. Dissent is critical for sustainable development. This is why 'strengthening' and 'working' of democracy is needed. Independent information, entitlements and enforcement of the law. Only then the front-yards of all will be clean.

This is CSE's world; our work is here. We continue to use our research and communication to build an informed and much-multiplied public opinion. We believe that we must stay relevant; purposeful and drive the change deliberately, with passion and commitment. We hope we can.

(Sunita Narain)

CLEAN AIR AND SUSTAINABLE MOBILITY

TO ENABLE OUR CITIES TO SECURE THE RIGHT TO CLEAN AIR AND PUBLIC HEALTH

THE Clean Air and Sustainable Mobility programme addresses the challenge of rapid growth and motorization that has enhanced air pollution, public health concerns and climate risks.

India and Africa—the targets of this programme—cannot remain conventional in their approach or act incrementally. These regions need a leapfrog strategy that is affordable, scalable, inclusive and inventive.

The programme influences national-and city-level policy and action and build regulatory capacity to enable the framing of clean air action plans to cut pollution from all sources, especially vehicular pollution.

It seeks to promote a mobility transformation by influencing national and city-level policy and action. It pushes for stringent emissions standards; curbing dieselisation by arresting the dramatic shifts towards personal vehicles, and arrest the growing share of fuel-inefficient vehicle stock and road-based freight transport.

Clean vehicles and fuels

BS VI ROADMAP FINALISED
CSE's sustained policy campaign scored a big win with the Government of India in September 2016 agreeing to skip BSV and leapfrog directly to BS VI for all vehicles in 2020. This is the first instance of such leapfrogging in the world. Euro VI standards are not only 90 per cent cleaner than current standards, they also equalize the emissions levels between petrol and diesel vehicles. This can reduce the toxic and warming impact of new motorisation.

BS IV DEADLINE ENFORCED
CSE contributed to the initiative of the Environment Pollution Control Authority, EPCA (a committee constituted by the Supreme Court of India to monitor progress on pollution-related cases in the National Capital Region) to ensure that the older BSIII norms are not extended beyond the deadline of April 1, 2017. This led to the decisive Supreme Court order on March 29, 2017 that has completely disallowed the sale of BSIII compliant vehicles beyond the deadline.

MILD HYBRIDS BLOCKED
The programme has pushed for reforms in the implementation of fuel economy standards to bring stringency, accountability, effective penalties for non-compliance, and to bring a fuel economy regime where diesel does not get an advantage through mild hybrid approach. CSE's critique of the Government's 'Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India', or FAME incentive programme, found that instead of promoting electro-mobility vehicles, the scheme was pushing "mild diesel hybrid cars". Close to 95 per cent of all four-wheeled vehicles sold under FAME have been mild diesel hybrid versions; a mere 3 per cent have been strong hybrids and 2 per cent, electric cars. Following CSE's research-led advocacy, the Department of Heavy Industries has disqualified mild diesel hybrid vehicles from getting any incentive under the FAME programme from April 1, 2017. CSE campaign will build on this early success to help reform the electric vehicle and hybrid incentive program, specifically for public transport and last-mile connectivity modes along with supportive infrastructure and to scale up the electric vehicle program in cities. This will contribute to the ultimate agenda for automobiles/ vehicles to eventually reach near-zero emission target.

EMISSION RECALL POLICY
In the context of the 'Volkswagen fraud', CSE's research contributed to an emissions recall programme in the newly amended Motor Vehicles Act. India will, for the first time, introduce real driving emissions (RDE) testing for four wheelers as part of the BSIV implementation.

Public transport and car restraint

BUS AND PUBLIC TRANSPORT STRATEGY
CSE's intervention through EPCA to expand parking spaces for buses in Delhi led to the identification of parking spaces for 1600 buses, clearing the way for procurement of buses that had been temporarily put on hold due to the alleged lack of parking spaces for new buses. The Delhi Master Plan was amended to allow multi-level parking in bus depots, creating additional parking for buses in Delhi. CSE's intervention also put on hold halt a myopic strategy of the Delhi government to augment the city's bus fleet by procuring a large number of mini buses. EPCA recommendations have also pushed Delhi Metro to procure more coaches to augment their system capacity. CSE recommendations on the city's parking policy have been incorporated into the base document for preparing Delhi's parking policy.

The programme made an important contribution by working with EPCA to develop a uniform city taxi policy, with focus on a policy on cab aggregators.

The Indian Road Congress has taken on board the programme's recommendations on safe access. CSE research on 'Environment and road infrastructure' and 'Manual for planning and development of urban roads' have been included in the Indian Road Congress (IRC) Manual for Urban Roads.

'The Pet'

Clean air action in cities

CSE's clean air action assessment methodology has helped prepare clean air action plans for Delhi-NCR. This work will be taken to other cities to help regulators develop a Clean Air Model that helps in data generation, scenario building and helps them build strategy for choosing and prioritizing actions.

SMOG EMERGENCY RESPONSE PLAN FOR NATIONAL CAPITAL REGION

CSE's campaign and policy advocacy following winter pollution and Diwali smog, the Ministry of Environment, Forests and Climate Change notified a 'graded response action plan' tied to daily air quality index. All state governments in NCR are now legally bound to implement this plan.

CSE's sustained campaign has resulted in action in controlling pollution from trucks, as the Supreme Court directive to collect an 'environment compensation charge' on each truck entry has led to a noticeable reduction in truck numbers. The process of installing Radio Frequency Identification, RFID, in trucks to strengthen monitoring of truck movement has progressed.

The Supreme Court has directed preparation of one comprehensive action plan for all pollution sources for Delhi and NCR that integrates all existing state level and central plans and is updated based on all new decisions and court orders in the matter. The detailing of all strategies for implementation and monitoring opens up new opportunities for making sustained impacts.

The Badarpur power plant was shut down for the winter after the Diwali smog campaign of 2016. The plant was allowed to reopen for the summer to meet the peak demand, and will be permanently shut after the sub-station is completed in the area in June 2018.

The programme has conducted several air quality monitoring exercises to build awareness and catalyse action. It carried out air quality monitoring inside Delhi High Court, and Tis Hazari courts to help authorities develop an indoor air quality plan. The indoor air quality monitoring of PM2.5 caused by burning solid fuels to cook the mid-day meals for school children in Anganwadi schools in Gaya district, led to the decision by the Bihar government to expand the LPG coverage in schools. CSE's report on the air quality monitoring in Meerut have been used by local residents to file a PIL in the National Green Tribunal. The NGT has asked the Central and state governments to respond to the petition. In Delhi, following CSE's hotspot monitoring of air quality in Anand Vihar, the Lt Governor Committee on air pollution control has instituted a local area air pollution management plan, which include dust control measures, paving of the Inter State Bus Terminal, and management of Ghazipur landfill site, among other measures.

DIRTY UNDERBELLY OF UNREGULATED FUELS

CSE began its investigations into the rampant use of extremely polluting furnace oil and pet coke, which are cheaper and widely available. These fuels are being used by industries and do not have any sulphur control specifications. CSE, through EPCA, has brought the matter to the attention of the Supreme Court. It has asked for a ban on the import of pet coke – a refinery by-product that is being dumped in global markets. India today imports huge quantities of this fuel, whereas exporting countries like US have restricted domestic use because of pollution. It has also asked for emission standards to be notified by SOX and NOX – pollutants from the use of this fuel and specifications for fuels. Our concern is that cheaper fuel is displacing the use of cleaner fuel – electricity from cleaner coal to solar – and greatly contributing to the enormous health burden from toxic air.

Global interventions

Outside India, the programme directly engaged with key government agencies of Ethiopia (Ministry of Environment Forests and Climate Change, MEFCC); Kenya (National Environment Management Authority, NEMA); and Nigeria (Federal Ministry of Environment, FEM), to provide support for wide ranging policy action, including creating guidance frameworks for clean air action plans in key cities based on local imperatives.

These frameworks include implementation of the key policy targets, including emissions standards roadmap, air quality monitoring strategies, import of used cars, and strategies for mobility and other polluting sectors. Target countries have set up inter-agency task forces with representation from key departments to oversee the implementation of the clean air action plans.

In Ethiopia, CSE's collaboration with MEFCC since September 2015 has now been formalised with the signing of an MoU, and the Guidance Framework for Clean Air Action drafted by CSE has been accepted as the base document for future work. A nodal body comprising related ministries/departments of environment, transport, Ethiopian Petroleum Supply Enterprise has been created to coordinate the implementation of the action plan.

In Kenya, the MoU signed with National Environment Management Authority (NEMA) identified key areas of cooperation, including developing a clean air action plan, and a detailed work plan for implementation. NEMA and MEFCC in Ethiopia have requested CSE to create air quality monitoring protocols.

A big result in Nigeria was the country's release of a roadmap for the introduction of fuels with lower sulphur concentrations, revised mainly with due consideration to their effects on human health. For diesel the new standards are 50 ppm (parts per million) sulphur (revised from 3000); Petrol-150 ppm (revised from 1500 ppm); Kerosene-150 ppm sulphur (revised from 1500 ppm). The Federal Ministry of Environment (FME) has acknowledged CSE's collaboration in finalising the country's fuel quality specifications. The new standards are to take effect from July 2017, and the country's refineries have been given 3-4 years waiver to upgrade their technology to be able to produce these grades of fuels by the year 2020. CSE had presented a guidance framework on clean air action planning to FME; the agency has requested the signing of an MoU to formalize the collaboration.

Country interventions were supported by knowledge support and capacity building. The programme engaged with 187 regulators and stakeholders from 37 cities/towns drawn from 14 states in India and 10 African countries in seven orientation/training workshops. It is clear that there is demand for CSE interventions in Africa. The National Environment Monitoring Authority, Kenya has requested a joint initiative to work on strategies for air quality monitoring and management, while the Nairobi Council has expressed interest in parking and non-motorised transport (NMT) strategies.

Pan Africa efforts have led to a joint decision by 14 African countries to create working groups of select officials around two common areas of concern -- used vehicle imports and on informal-

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FARM FIRES

Satellite images show reduction in crop residue burning in Punjab and Haryana in summer: Intervention through EPCA has led to higher enforcement, incidence of challans and fines; state governments have reported drop in incidences of crop burning in Punjab and Haryana

The programme was able to broaden the ambit of the air pollution dialogue from a city-specific to a regional discussion, and ensure action mechanisms are established at all levels. In 2016, the campaign supported EPCA in highlighting how unabated crop residue burning from neighbouring regions, firecracker burning during Diwali, coupled with meteorological conditions led to one of the worst winter pollution episodes in a decade.

This helped build pressure on Punjab and Haryana for tighter enforcement and fines. The programme also explored alternatives as well as augmentation of subsidy on mechanical implements. Punjab and Haryana have both reported a drop in incidences of crop burning.

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formal public transport system. These have emerged as a clear priority of work for the programme at the pan-Africa level, with the objective to assess the local imperatives, best practices in the region and to firm up the strategy to deal with these common concerns.

The programme is actively engaged with global processes and platforms – including with Urban Health Initiative of the WHO to help bring focus on the linkages between health and short-lived climate forcers and with the UNEP Partnership on Clean Fuels and Vehicles. CSE participated in the Non-CO2 Summit in Slovenia; and in the Global Fuel Economy Initiative's annual global event in Paris.

CLIMATE CHANGE

TO PUSH FOR LOW CARBON GROWTH STRATEGIES, MAINSTREAM CLIMATE CO-BENEFITS AND BUILD A CLIMATE-RESILIENT SOCIETY IN INDIA, AND WORK TOWARDS AN AMBITIOUS CLIMATE DEAL IN THE GLOBAL ARENA, BASED ON EQUITY, FAIRNESS AND HISTORICAL RESPONSIBILITY

CSE has advocated an ambitious and equitable global deal in which the developed world takes the lead in cutting its emissions and supports developing countries to move towards a low carbon growth path. These include pushing for cuts in emissions in coal-based power plants for resource efficiency goals in the industrial sector; to efforts to make buildings more energy-efficient to prevent the lock-in of carbon and efforts to promote energy access for the poor through clean energy sources, and pushing air quality measures to meet local health and mobility goals and climate co-benefit in terms of reduced CO_2 and black carbon emissions for climate mitigation. As a global climate mitigation effort, CSE engages with global processes to phase out HFCs. But mitigation is not going to be sufficient; there is need to mainstream climate adaptation into developmental plans and policies: agriculture, water, forests, fisheries, urban infrastructure, etc. Prudent natural resource management is key to combat climate change.

Strengthening the Paris Agreement for equity and ambition

CSE has consistently tracked climate change negotiations and co-hosted side events at COPs with the government of India; reported on climate change impacts; built knowledge and interest of journalists from developing countries on global climate science and politics and engaged the youth in south Asia on climate politics, policies, and practices. CSE has established a comprehensive climate change information repository of research and policy documents, best practice documentation, news & features.

CSE's campaign remains focused on pushing the equity approach and demands rich countries to raise ambition and strengthen finance and technology transfer to poor countries. Given the current opportunity to intervene in the creation of 'rulebook' implement the provisions of Paris Agreement, CSE's global work is now focused on the global stocktake as part of the carbon budget within the Paris Agreement, which is the assessment of collective efforts of progress in climate action by Parties, that is due in 2023.

In 2016-17, during COP 22 in Marrakech, CSE presented it policy brief on global stocktake, building on previous years' research on the carbon budget as a modality to operationalize equity. The policy brief received positive reviews from civil society members drawn from Act Alliance, Action Aid, Bread for the World, Dan Church Aid, as well as from negotiators from Sri Lanka, Nepal, Pakistan and Kenya; and from researchers from Universities – UN, Tokyo, Canada and Singapore University, among others.

CSE continued to facilitate the travel, stay and briefing of journalists to the climate negotiations. CSE supported the participation of four journalists to COP 22. CSE also continued the reportage and communication of its position on climate change and published more than 30 global stories on climate change in 2016-17. During the year, CSE's views on equity and climate justice were forcefully projected globally in the documentary, 'Before the Flood', made by Leonardo di Caprio, which carried interviews and field-level footage of climate impacts from a district close to Delhi.

Build resilience of the poor with focus on agriculture & food security

CSE developed a strong coalition around its proposal on a globally-supported agricultural insurance to help farmers in poor countries better cope with losses caused by extreme and variable weather.

Building on its work on agricultural insurance in India, CSE designed and pushed for a proposal for a globally supported agricultural insurance mechanism within Warsaw International Mechanism (WIM) under the Paris Agreement.

The proposal, the first of its kind with elements on how to make it work for poor countries, was presented at the Regional Conclave for Africa in Nairobi in August 2016. The proposal was welcomed and endorsed by negotiators, agricultural insurance practitioners and activists of 15 countries of Africa and Asia. The proposal was also shared at a side event in COP 22 in Marrakesh org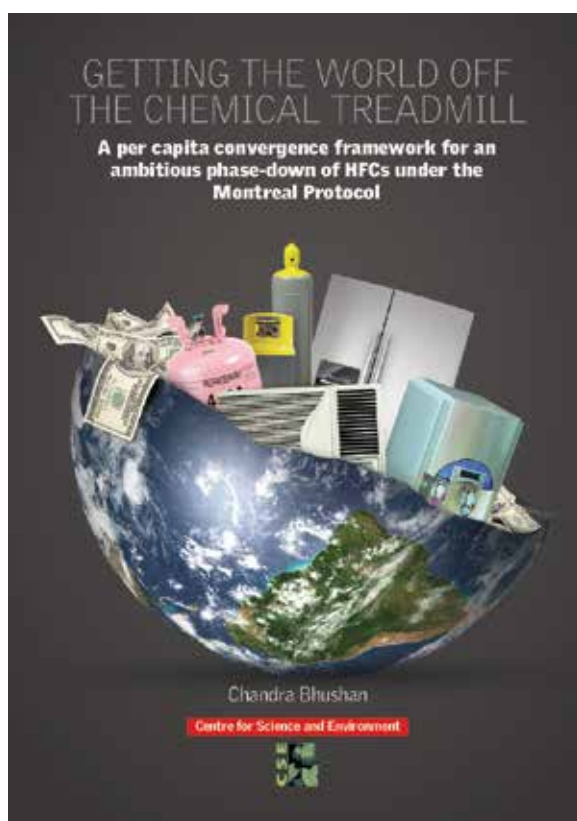anised jointly by CSE, ACT Alliance, Nigeria and Fiji to push for the inclusion of such a safety net. It has been informally supported by many developing countries, including Mali, Nepal and India, in addition to CAN-I and members of Executive Committee (ExCom) of Warsaw International Mechanism (WIM). CSE has formally submitted the proposal to WIM as part of its review process.

At the regional level, CSE's work was focused on improving food security governance in South & Southeast Asia. In 2016-17, CSE worked with partners in Nepal, Bangladesh, Myanmar to identify good practices of climate resilient agriculture in the south Asian region. CSE documented the indigenous, eco-friendly farm practices of Nepal and Bangladesh. To facilitate in-depth reportage on food security, a was organised workshop in Nepal for local journalists on food security governance.

In India, CSE's recommendations to the Ministry of Agriculture and Farmers Welfare on the Pradhan Mantri Fasal Bima Yojana (PMFBY) were incorporated in the final policy.

GETTING THE WORLD OFF
THE CHEMICAL TREADMILL

A per capita convergence framework for an
ambitious phase-down of HFCs under the
Montreal Protocol

Chandra Bhushan

Centre for Science and Environment

Global campaign on HFCs

CSE's active role at the global stage helped develop a comprehensive negotiating strategy for the global South, which included phase-down of HFCs, improvement in energy efficiency and promotion of non-patented natural refrigerants. A big win in the year for the programme was the Agreement in Kigali to phase-down HFCs, which represents the only legally binding and appropriately differentiated environmental treaty since the start of the 21st century.

As a key voice of the global south, CSE helped build confidence and consensus to achieve the 'Kigali Amendment to the Montreal Protocol' reached by 197 countries in October 2016. This historic amendment is expected to reduce HFC use by 85 per cent by 2045; and energy efficiency has been included as part of the deal and global push to adopt natural refrigerants. The agreement includes a deal on the destruction of the stock of HFC 23.

CSE contributed to the discussions on IPR as part of the final HFC phase-

down amendment, with India pushing for a delay in the HFC phase-down until the patents for the synthetic alternatives have expired, which was accepted as part of the final HFC phase down Amendment. The programme organized seven workshops and side-events to engage stakeholders, and published 11 briefing papers and reports to bring new knowledge on the table.

In India, CSE pushed the government for a directive to destroy HFC 23 stocks voluntarily, and with immediate effect, which will lead to 100 million tonnes CO_2e emission reduction by 2030. The programme catalyzed the constitution of a committee in November 2016 within the Bureau of Indian Standards (BIS) to deliberate on CSE's recommendations to make safety standards more amenable to the large-scale use of hydrocarbons. CSE's advocacy also contributed to an agreement to form an international task force to expedite the development of such safety standards under the Kigali HFC phase-down amendment.

ENVIRONMENTAL GOVERNANCE

TO IMPROVE CORPORATE GOVERNANCE, HELP INDUSTRY INTERNALISE RESOURCE EFFICIENCY AND POINT IT TO THE PATH OF LOW CARBON DEVELOPMENT; ALSO, TO STRENGTHEN POLICY FRAMEWORKS, ADAPTIVE CAPACITIES AND COMMUNITY RESILIENCE FOR PARTICIPATING IN DEVELOPMENT PROJECTS

THE industry sector in India and the global South confronts several interrelated environmental challenges – from weak planning, monitoring and regulatory procedures, to poor capacities of pollution control agencies; from industry struggling to deal with newer pollutants, to the high costs of pollution control and the challenge of mitigating emissions for low-carbon growth.

The programme seeks to promote optimal resource use, reduce environmental damage from extractive and manufacturing industries and prevent lock-in of greenhouse gas emissions and local air pollution. It is geared to help industry become more resource efficient, socially acceptable and environmentally responsible.

RESOURCE EFFICIENCY

The programme theme is designed to help reduce the carbon-intensity of the industrial sector and improve resource efficiency in India and in select emerging economies in Africa and Asia. It rides on the opportunity presented by delayed economic growth that can pave the way to cleaner pathways with less polluting and more resource-efficient technologies.

The programme today comprises two themes, global engagement on improving resource efficiency and pollution standards in thermal power plants, and pushing resource efficiency in resource intensive industrial sectors.

Programme on Coal-based Thermal Power Plants (TPPs)

In 2016-17, CSE made a strong push to ensure that the recently notified environmental standards for coal based power plants were implemented. In December 2015, CSE's research and advocacy led the government to make a landmark decision to tighten the standards for coal-based thermal power plants (TPPs). Following this important win, the programme's focus is on the implementation and compliance of these standards. CSE organized workshops and meetings and engaged extensively with key stakeholders to strengthen regulatory abilities and catalyze industry readiness to implement the new standards to push TPPs towards improved energy and resource efficiency.

The programme provided data inputs to the Union ministry of environment, forests and climate change (MoEFCC) to help it address the concerns raised by the Union ministry of power as well as industry on costs and options regarding the new environment standards; the data provided by CSE has now become broadly acceptable. CSE's policy brief, 'New Environmental Norms for the Power Sector', provides a roadmap for the implementation of the December 2015 notified environmental standards for coal-based TPPs.

The programme worked closely with the TPPs – its engagement with the National Thermal Power Corporation, the country's largest energy conglomerate, led to the affirmation that they will meet the standards for PM and water use by the December 2017 deadline. CSE also worked with the Bathinda thermal power plant to suggest ways to comply with the new standards. A report, 'Clearing the Air: Pollution Control Technology Options of Coal-Based Power Plants', outlined technological options available for the sector to comply with the new environmental norms.

CSE's research on resource efficiency was acknowledged by the Ellen MacArthur Foundation in their influential report on circular economy vision for India, launched in Delhi in December 2016. Research on circular economy was presented in an international regional conference organised by Economic Research Institute for ASEAN and East Asia (ERIA), comprising a high level gathering of ASEAN Secretariat, government and civil society representatives drawn from ASEAN countries, international think tanks and multilateral organizations such as the UN.

CONTINUOUS EMISSION MONITORING SYSTEMS

Continuous Emissions Monitoring Systems (CEMS) to continuously collect, record and report the required emissions data, is now an integral part of implementing the new thermal power standards. CSE is perhaps the only non-governmental organization in the country with the requisite knowledge and experience on CEMS. Efforts are now directed to the development of standards and protocols for CEMS and pushing for its early implementation — in power plants initially and later in other industry sectors. CSE commissioned a 'Technical Guidance Manual', a first of its kind document in India to help institutionalize the adoption of CEMS by Indian industry. CSE has also instituted an expert committee to help strengthen CEMS certification and lab accreditation / empanelment systems, and to suggest improvement to pollution regulators on its draft guidelines and protocols. The draft guidelines for CEMS implementation by the Central Pollution Control Board (CPCB), the country's chief pollution regulator, has adopted most of CSE's recommendations.

The programme has engaged with CEMS device manufacturers, pollution monitoring laboratories, service providers and industry representatives on improving pollution monitoring and compliance enforcement. CSE anchored a field exposure visit of Indian regulators to Germany to showcase best available technologies and CEMS implementation, and initiated training on this specialized area. As part of its global engagement, team members attended the international CEMS conferences in Lisbon and the AQE conference in the UK.

Global programme

The learning from India was used by the programme to build dialogue with other coal-dependent countries to push for changes in pollution regulations and efficiency standards in the coal-dependent global South, in particular in South Africa, Indonesia and China.

In Indonesia, the programme commenced with a detailed scoping study covering fleet profile, environmental performance and regulatory landscape. CSE's research and policy success in India helped it engage with a wide range of stakeholders, including the Ministry of Environment and Forestry (MoEF) and with Ministry of Energy and Minerals (MoEM), together with industry and civil society think tanks.

CSE's research contributed to the debate on electricity markets and the role of clean coal-based power. CSE was invited to make a presentation at National Electricity Day Event on coal TPPs in Jakarta by the Ministry of Energy and Mineral Resources. An inter-departmental meeting was

organized by MoEF (Air Pollution Directorate) in which the ministry has shown interest to revisit the existing standards. MoEF also asked for a comparative report on efficiency and pollutions standards in India, China and Indonesia to explore regulatory changes. CSE research showed compliance is hobbled by gaps in monitoring and reporting of pollution data and technical skills of regulators, and the programme will conduct trainings for ministry officials on continuous emissions monitoring systems (CEMS).

CSE forged a strong relationship with the Indonesian Centre for Environmental Law (ICEL), a local NGO that advises the Indonesian government on air quality regulations, to push tighter TPP norms. A report on India-China-Indonesian power sector performance and regulations is being prepared jointly by CSE, ICEL and Rock Environment Institute, China, which will serve as an important advocacy tool to change pollution

norms in Indonesia.

Coal-based power sector's evolution in China provides constructive knowledge to India and other emerging markets about emissions, abatement technology and policy prescriptions – their successes and failures. The programme has built relationships with several think tanks in China. In 2016-17, CSE commissioned the Rock Environment Institute to prepare a report on the environmental performance of the power sector in China, the basis of emission standards and implementation challenges. The report is important in that it signals to other coal-dependent economies in the global South, including Indonesia, that timelines to switch to cleaner emissions standards are achievable, and that regional standards are required. The report also provides a roadmap on investment support and tariff modification.

ENVIRONMENT ASSESSMENT AND COMPLIANCE ASSURANCE

The focus of this theme is to catalyse institutional reform to strengthen regulatory practices on environmental governance, with focus on building capacities of regulators on environmental assessments (EIA and SIA), monitoring, compliance assurance & enforcement

India programme

In India the programme focused on building capacities of regulatory institutions. CSE trained the State Pollution Control Boards of Himachal Pradesh and Goa, and held a workshop on bio-medical waste in Jharkhand. Under CSE's partnership with IIM Kashipur, CSE conducted trainings on Social Impact Assessment, Environmental Impact Assessment, Corporate Social Responsibility and wastewater management. CSE also conducted a series of trainings on SIA for the Karnataka Revenue Department.

Research and advocacy on the bricks sector gained focus in the year, given the significance of black carbon emissions and environmental and social problems of the sector. CSE's inputs on the need for technology-based standards to lower overall emissions, including black carbon emissions, were incorporated in the revised draft standards. These policy suggestions were championed by EPCA, which passed an order for the conversion of all existing kilns to 'zigzag' by December 2017.

Southern network of pollution regulators

The programme works closely with regulatory agencies in three countries in Africa on this broad initiative.

In Tanzania, CSE assisted the Ministry of Energy and Minerals in preparing EIA guidelines as well as inspection manuals for the mining sector (for large and medium scale mines, and for small/artisanal mines). This is a notable contribution to systematise inspection of environmental performance of mines, given the fact that the country does not have any guidelines, and inspections of mining operations are being conducted in an ad hoc manner. The draft manuals have been circulated to all zonal mine officers for final comments before being notified.

CSE also organised a study tour of small-scale mines, together with a consultation convening key stakeholders. A new partnership was established with National Environmental Management Council (NEMC), the national institution responsible for enforcement of environment policy and overseeing environmental management in Tanzania on collaboration on key priorities areas requiring EIA guidelines.

In Namibia, CSE has initiated work in 2016-17 with the Ministry of Environment and Tourism on a review of Environmental Management Act, and on training the country's environment regulators on EIA and industrial inspections. The training organised by CSE drew participants from environment, tourism, mines & minerals and coastal conservation, ministries of water, forestry and agriculture. Specifically, CSE reviewed and provided inputs into the country's draft Environment Management Act, and prepared screening questionnaire for sand mining, which will help regulators decide whether mining projects require EIA clearance. CSE also prepared a document, 'Initial appraisal process for sand mining', which will help regulators in appraising small-scale sand mining projects for which EIA is not required.

In Ethiopia, the Ministry of Environment, Forest and Climate Change, requested CSE to develop water quality monitoring protocol for the Awash Basin which once implemented, will be used for other basins in Ethiopia. CSE also trained ministry officials, municipalities and industry representatives on water infrastructure.

INDUSTRIAL ACCOUNTABILITY AND COMMUNITY SUPPORT

This programme addresses the industry-community interface, with particular focus on making the mining sector environmentally and socially responsible.

CSE has a rich legacy of research and advocacy on the challenges faced by mineral-bearing areas, and has been a strong advocate for instituting a mechanism of benefit sharing that recognizes the rights of project affected communities to benefit from resources on their lands.

After a decade of discussions and negotiations, India's central mining law, the Mines and Minerals (Development and Regulation) Amendment Act, 2015, was amended to mandate the sharing of mineral wealth with communities. The Act provides for establishment of the District Mineral Foundations (DMFs) as a non-profit statutory 'Trust' in every Indian district affected by mining-related operations, to "work for the interest and benefit of persons, and areas affected by mining-related operations". Funds accrue to this Trust by a mandatory contribution from mining companies. If properly implemented, DMFs have the potential to improve the lives and livelihoods of the poorest communities of India.

In 2016-17, CSE worked closely with the governments of mining-rich states for the effective operationalization of DMFs. CSE's Model District Mineral Foundation Trust Rules are today reflected in the rules framed by many mining states. The states of Jharkhand, Telangana, Andhra Pradesh, Karnataka and Rajasthan have solicited CSE's help to develop DMF rules.

CSE is working closely with state and district officials, and with mining affected communities in Jharkhand, Odisha and Chhattisgarh to strengthen the institutional mechanisms of DMFs to ensure proper planning, monitoring and accountability. Efforts are geared to build a civil society network to review DMF implementation in their respective areas. In Jharkhand, DMF Trusts have been registered in all districts, while Odisha has accepted CSE's inputs on the mechanism of registration of DMF Trust.

SUSTAINABLE WATER MANAGEMENT & SANITATION

ESTABLISH POLICY PRINCIPLES, INNOVATIVE TECHNOLOGIES AND IMPLEMENTATION STRATEGIES FOR WATER AND WASTEWATER MANAGEMENT TO HELP LAY THE FOUNDATIONS FOR A WATER AND WASTE-PRUDENT SOCIETY

With growing urbanisation and affluence, cities are becoming water guzzlers, drawing water from cleaner upstream sources and discharge their waste—sewage and industrial effluents—downstream. Cities are too poor to afford the capital intensity of the modern sewage system and the energy required to transport, pump and treat wastewater. The current method on water and wastewater management used by cities is capital and resource-intensive, while the benefits do not percolate down to the urban poor.

CSE's Sustainable Water Management and Sanitation programme is geared to help re-invent the urban water-wastewater management system. Interventions are designed to help build institutional and technical capacities of key agencies and practitioners; install demonstration projects on alternative technologies that serve as useful models of good practices; and leverage policy and implementation opportunities by working closely with city-level water and sanitation agencies.

Septage planning for cities in Ganga basin

A key area of intervention has been on septage management in cities, including on faecal sludge management (FSM) to deal with the daunting challenge of on-site sanitation. The programme has focused on the rapidly urbanising Ganga Basin, which accounts for close to 40 per cent of India's population, and where about 40 per cent of the towns continue to be dependent on on-site sanitation. Bihar and Uttar Pradesh are the focus states, where CSE works with municipalities and elected officials in 12 cities on septage planning, including faecal sludge management (FSM) and in preparing city sanitation plans (CSPs). Over 30 cities are in the process of finalizing CSPs.

Ten cities in Ganga basin have set up city sanitation task forces (CSTFs) that have passed council resolutions. Uttar Pradesh is now supporting pilot projects – both on decentralised wastewater treatment and faecal sludge treatment plants in four cities. In Bihar, the Ministry of urban development has earmarked funding for FSM in four cities.

As the lead Indian partner of the GIZ-led global consortia on creating innovative 'shit flow diagrams', or SFDs, to map excreta 'flows' across 50 global cities to aid credible sanitation mapping, planning and implementation.

Over the last two years, CSE has worked with city authorities to develop SFDs for 27 cities (*see image below*) and is guiding them on incorporating the SFD tool to improve their sanitation planning and strategies. The programme has trained national and international master trainers from Ghana, Bangladesh and Bihar to develop SFDs in their respective cities. SFDs were also used in six champion cities to prepare more effective and implementable CSPs.

Following CSE's assistance in rolling out a rapid assessment for FSM using the SFD tool, the city of Trichy in Tamil Nadu has secured funding under AMRUT, the government's flagship urban renewal programme, to set up a faecal sludge treatment plant (FSTP) for septage management. SFDs have attracted worldwide interest and attention on this important mapping and planning tool, including from several multilateral agencies such as the Water & Sanitation Programme of the World Bank and Population Services International, seeking assistance in creating SFDs.

CSE contributed to the development of a 'rapid assessment tool' to calculate budgets required for FSM; the tool was adopted by AMRUT to calculate budgets for FSM across 500 cities in India. The programme made important contributions to the national policy on Faecal Sludge and Septage Management, which was launched by the Union ministry of urban development in February 2017.
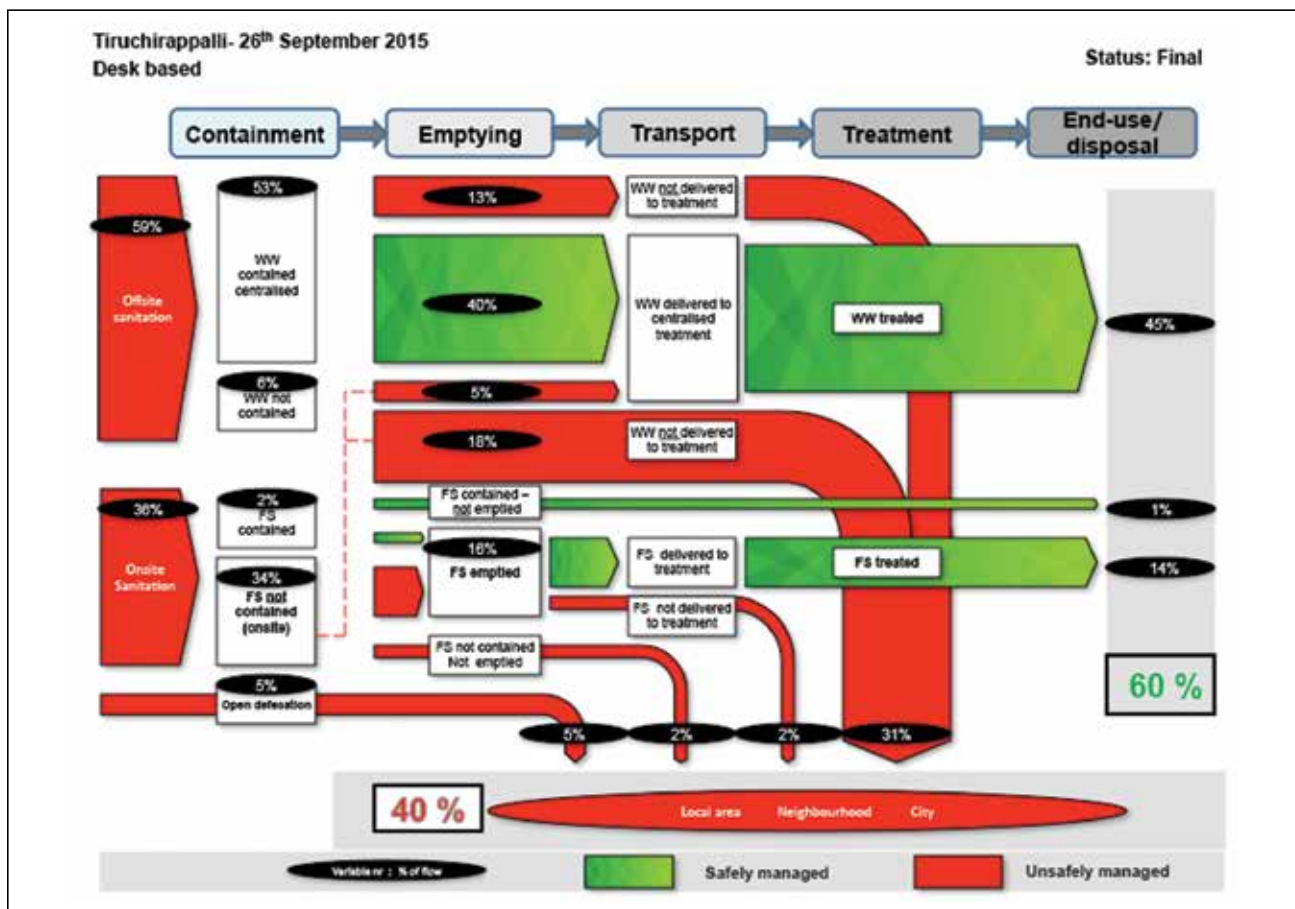
TRAINING

Training programme on Urban Rainwater Harvesting, Sept. 24-27, 2016, Joydebpur, Bangladesh

The water-wastewater programme builds capacities of public institutions, city authorities and practitioners to address challenges in rural and urban water supply. CSE has been empaneled as a Centre of Excellence of the Union ministry of urban development.

Trainings have helped build capacities of more than 500 participants in India on water-sensitive design and planning (including water sensitive design and planning and rainwater harvesting), and decentralised wastewater treatment (septage management, city sanitation planning and creating city-specific 'shit flow diagrams', or SFDs).

The programme's capacity building activities have been significantly scaled up with the empanelment of CSE by the ministry's flagship AMRUT programme on urban renewal (2015-2019). Under the scheme, CSE trains urban local bodies and elected city representatives from Delhi, Jharkhand, Andhra Pradesh and Goa on sustainable water and wastewater management.

The programme has expanded in many parts of the global South by partnering with research institutes and government agencies. In Kenya, the programme works closely with Kenya Water Institute (KEWI) to host Pan Africa trainings on sustainable water management. In Rwanda, it partners with the Rwanda Ministry of Infrastructure and the Rwanda Natural Resource Authority (RNRA). In Bangladesh, the programme's

partnership with WaterAid has continued; and in Ghana, it collaborates with the Environmental Health and Sanitation Directorate of the Ministry of Local Government and Rural Development. In South Africa, it partners with the Water Research Commission (WRC), widely acknowledged as the region's sector leader.

Training events in Bangladesh, Rwanda and Kenya have reached more than 200 participants, drawn from key government agencies, research & academic institutions as well as private consultants and NGOs. Following the training events in Bangladesh, Khulna University, University of Information Technology Science, and the Independent University Bangladesh have incorporated rainwater harvesting as a module in the university course curriculum.

CSE supported the government of Rwanda (RNRA) by providing inputs in the country's national rainwater harvesting strategy, with focus on floodwater/storm water management, and in developing a proposal to mainstream RWH in all blocks in the country. The policy is under review and is expected to be notified in the coming year. A water information centre in collaboration with RNRA is also being planned. Likewise, the Ministry of local government and rural development, Ghana, has invited CSE's inputs for its planned policy on faecal sludge management policy.

INDIA'S FAECAL SLUDGE MANAGEMENT LAB

CSE is setting up a state-of-art, independent resource and referral environmental monitoring laboratory with the capability to test for a range of biological and chemical contaminants in water and wastewater. The Lab will be capable of developing testing protocols, input-output analysis and method validation to testing wastewater and faecal sludge. As the first of it's kind in India, the Lab will validate various water and wastewater technologies and practices, suitable for the global South. As part of its mandate under the 'Ganga Monitoring Plan', the Lab will regularly monitor key pollution parameters from targeted sites in the Ganga Basin, including testing effluent quality of treated wastewater from industries, institutions, apartments and municipal wastewater treatment plants and couple selected river sites. The Lab will help train a wide range of stakeholders – ULBs, Jal boards, water & waste utilities, PHED engineers, select regulatory agencies and city development authorities, among others.

Global partnerships, for instance, CSE's partnership with the University of KwaZulu-Natal, as well as with AIT-Bangkok, brought exposure to international best practices for the FSM Lab and helped build capacities of Lab staff.

Model projects

CSE's model 20-KLD decentralised wastewater treatment system at the headquarters of the Delhi Jal Board, the city's water utility

The programme provides handholding technical support to implement 'model projects', which are essentially demonstration & 'proof of concepts' on water and wastewater management. A model project on rainwater harvesting was installed on KEWI's campus in Kenya. In Bangladesh, CSE conducted technical trainings and provided handholding support for WaterAid's partners to implement pilots on rainwater harvesting in the country. Pilots on rainwater harvesting as well as decentralized wastewater treatment are being planned at a school run by 'Viva Foundation' in Mamelodi, South Africa.

The Anil Agarwal Environment Training Institute in Nimli, Rajasthan, been designed as a learning, innovation and demonstration centre on resource efficiency. The entire campus is designed to capture rainwater and use it to recharge groundwater or stored in tanks. The buildings are fitted with water-efficient fixtures, and the campus includes three decentralised wastewater treatment technologies – soil biotechnology, improved septic tanks and decentralized wastewater treatment using aerobic and anaerobic processes to promote on-site treatment of wastewater generated.

GLOBAL ALLIANCES

The programme is today plugged into various national and international networks on water and sanitation, including the India Sanitation Coalition; a GIZ, Germany-led consortia on that creates innovative tools to help cities plan and implement sanitation projects; and is also tapped into the worldwide network of technical and research institutions supported by the Bill & Melinda Gates Foundation. CSE is also part of the Global Faecal Sludge Management e-Learning Alliance, an international consortia comprising sector leaders including UNESCO-IHE Institute for Water Education; Swiss Federal Institute of Aquatic Science and Technology (eawag); Asian Institute of Technology, Bangkok; International Institute for Water and Environmental Engineering (2ie); Bangladesh Institute of Engineering and Technology; University of KwaZulu-Natal; and the Bill & Melinda Gates Foundation (BMGF). These networks allow and encourage information exchange, technical know-how as well as offer learning opportunities.

National consultation on rural sanitation

India alone accounts for 600 million of the 1 billion people globally with no toilets, and 50% of India's population defecates in the open. More than simply building toilets, the national sanitation campaign will only succeed under a closely monitored community-centric approach that addresses public health concerns and women's dignity.

The national consultation brought together sanitation champions, health and technical experts, consultants, government officials, non-profits and donors. The focus of the meeting was on behavioural change and the availability of data on rural sanitation.

Government officials outlined new initiatives, including rating of the districts on cleanliness and solid-liquid waste management, and debated on the efficacy of subsidies. The chief guest, Parameswaran Iyer, Secretary, Ministry of Drinking Water & Sanitation, said that unlike previous national sanitation efforts, the Swachh Bharat Mission focuses on behavioural change. Health experts from World Health Organisation, the All India Institute of Hygiene & Public Health and the Indian Institute of Public Health pointed out the difficulty in establishing links with public health in the absence of reliable data.

WASTE MANAGEMENT

TO ADDRESS THE MANAGEMENT, TECHNOLOGIES, AND REGULATION TO DEAL WITH WASTE GENERATION FOLLOWING THE GROWING AFFLUENCE AND RESOURCE-INTENSIVE CONSUMPTION

THE programme addresses institutional structures involved in waste management, treatment and disposal; helps build regulatory and technical capacities of cities in waste management; and highlights the role of the informal sector.

Interventions include strengthening regulatory practices, exposure to best practices on waste handling and disposal, including municipal, hazardous, e-waste & biomedical waste, and creating handy toolkits to simplify waste handling and management, including standard operating procedures (SOPs) on effective compliance, monitoring and enforcement for waste handling, processing and disposal.

Solid waste management in India

The initiative pushes for a host of waste management and treatment measures to tackle the challenge of waste management in India. This includes segregation at source, imposition of usage fees and penalties for non-compliance and littering. The programme is geared to understand the solid waste management challenge in the country, the numbers behind it, the gaps that exist and the path towards harnessing the opportunities.

CSE's initiative has been received well by central and state governments. The Union ministry of environment, forest & climate change, and Central Pollution Control Board invited CSE to be one of the nodal agencies for capacity building of urban local bodies (ULBs) on waste management, and support the implementation of the Municipal Rules, 2016 in the coming year. The

ministry also notified E-Waste Rules in March 2016, incorporating most of CSE's recommendations.

CSE's seminal publication on solid waste management, 'Not in My Backyard', highlighted the growing problem of waste in urban areas and carried in-depth case studies from cities following good solid waste management practices, as well as enabling policies and regulations. The publication was lauded by the Minister of urban development at the launch of Swachh Sarvekshan programme in August 2016. The National Green Tribunal used excerpts of the book in its judgment dated December 22, 2016 on compliance of Municipal Solid Waste Rules 2016 − specifically, segregation

at source, use of segregated waste for waste to energy plants, and shifting focus on waste collection, or 'tipping fee', from how much is collected to how much is processed.

CSE worked with the state governments and was on the advisory committee of Kerala, Bihar and Himachal Pradesh on waste management. The government of Bihar has made segregation of waste mandatory, and has directed urban local bodies to develop supportive infrastructure and capacities.

In Madhya Pradesh, CSE has worked closely with Balaghat Municipal Corporation to adopt a pan-decentralised model for waste management for the city comprising segregation and treatment of waste

at source. Meanwhile, the Odisha State Urban Department has invited CSE to help the state adopt the best composting technologies and support decentralised waste management across the state.

Following the notification of the new Solid Waste Management Rules, 2016, CSE helped build capacities of 171 ULB officials decentralized waste management drawn from across the country, including Bihar, Punjab, Haryana, Delhi, and some Southern states and the Northeast. CSE also published a training manual on biomedical waste management.

As part of its initiative to support implementation, CSE signed a MoU with the city of Muzzafarpur in Bihar to develop an enabling framework for solid waste management. This template will be used in other cities and towns in India.

Global interventions

The programme is actively engaged in Swaziland and Zanzibar in Africa to assist these countries on framing policy, regulations and strengthen prudent waste management practices.

The MoU signed with Zanzibar Environment Management Authority (ZEMA) represents the first bilateral collaboration between Zanzibar and

India. It is clear that there is much demand for CSE's assistance, especially in the hotel and tourism industry, where CSE is providing inputs into the national strategy on waste management, including at-source segregation and septage management. ZEMA has also requested CSE's assistance in preparing EIA guidelines for hotels in Zanzibar. Hotels in Stone Town have agreed to start segregation at source, while Hyatt Hotel has agreed to adopt decentralised management within its hotel compound.

In Swaziland, CSE assists Swaziland Environment Authority (SEA). CSE's scoping study on current waste management practices was presented to the country's Cabinet by the Minister of Environmental Affairs and Tourism as a third-party assessment of Swaziland's waste management. As

part of its cooperation with SEA, CSE is developing an action plan to make the country a 'zero landfill country' by 2022, and will contribute to Swaziland's draft strategy on waste management. SEA has put together a task force to work with CSE to prepare integrated policy on waste management for Swaziland.

The country's regulators have also requested CSE's assistance in preparing guidelines for recycling, plastic waste management and technologies for waste management. The cooperation has led to high visibility events, such as CSE's participation (as chief guest) in the Waste Indaba, a dialogue on waste management, which drew 150 representatives from town councils, town boards and the chief dorms of the country.

FOOD SAFETY AND TOXINS

TO INFLUENCE THE FOOD BUSINESS TO ALIGN WITH SOCIETAL OBJECTIVES OF NUTRITION, LIVELIHOODS AND SAFETY

THE programme adopts a range of measures and approaches, from laboratory tests on food, toxins and nutrition, to research, surveys and policy analyses, advocacy and campaigns targeted at schools, health professionals, food policy makers, health regulatory and food certification agencies and the general public.

It addresses new challenges on environment and health, and responds to the emerging issues, such as junk foods and non-communicable diseases (NCDs), and the growing crisis of heavy antibiotic use in food animals and the environmental spread of antimicrobial resistance in humans. The campaign against toxins in food, including safe pesticide use policy, pushes for reform in the regulation of toxins in food for reduced public health risks; while the 'Good Food' campaign connects organic food and food safety to livelihoods of food producers and nutrition for all.

Contributions to India's National Action Plan (NAP) on AMR

Antimicrobial resistance has been globally recognized as an emerging public health crisis as antibiotics are becoming increasingly ineffective against disease-causing bacteria. In 2015, the WHO released a global action plan on AMR and passed a resolution urging member countries to develop national action plans by May 2017.

CSE studies and lab tests in previous years had highlighted the widespread misuse of antibiotics in rearing chicken, fish and honey production, and the programme has been closely involved in developing India's National Action Plan on AMR, through making inputs on policy and programmes required to control animal and environment aspects of AMR. CSE has also been instrumental in developing strategic and operational guidance for AMR National Action Plans for developing countries.

Use of potassium bromate as food additive banned after CSE study

Tests conducted by CSE's pollution monitoring laboratory found residues of potassium bromate/ iodate in over 84 per cent of bread and bakery samples sourced from Delhi. This led the Food Safety Standards Authority of India (FSSAI), the country's food regulator, to ban the use of potassium bromate and remove it from the list of permissible additives in India. The bureau of Indian Standards proposed the removal of both potassium bromate and potassium iodate in all relevant standards for different types of breads. The study was extensively covered by the media and helped build consumer awareness on the presence of toxins and the need for accurate food labeling in packaged foods.

Food labeling claims and food advertisements

CSE's report on food labeling highlighted policy and practice gaps regarding food labels, claims and advertisements in India. The report benchmarked food labeling with international regulation practiced in countries such as EU, US, Canada, Thailand and Mexico, and recommended a range of measures to contain the spread of unhealthy foods in India. Public advocacy engagements with policy makers, media, the food industry, as well as consumers pushed the agenda of responsible food labeling and advertising, with particular focus on celebrity endorsement of unhealthy, junk foods.

India's biggest online diet tool-Know Your Diet survey

CSE's 'Know Your Diet' food survey was launched in September 2016 to fill an important information gap to understand consumer behavior and what people in India are eating. The survey is an interactive tool that gives an easy-to-understand personalised diet report, complete with feedback and advice. In view of the growing diet related concerns among school children, the survey is promoted in schools to educate students on healthy eating. More than 13,500 school children and 3,000 adults have taken the survey. The survey complements CSE's campaign against junk foods in schools. Nagaland recently banned junk foods in schools and nearby spaces.

New lead standards in paints

CSE studies and tests on lead in paints in 2009 had found close to 72 per cent of the samples of major paint brands had much higher lead content than the voluntary limit that was specified by the Bureau of Indian Standards (BIS). This alarming situation and the consequent advocacy contributed to the notifications issued by the Union ministry of environment, forest and climate change, 'Regulation of Lead Contents in Household and Decorative Paints Rules, 2016', that prohibits the manufacture, trade, import as well as export of household and decorative paints containing lead or lead compounds in excess of 90 parts per million (ppm).

SUSTAINABLE BUILDINGS AND HABITAT

TO DEVELOP AND FACILITATE IMPLEMENTATION OF POLICIES, STRATEGIES AND PRACTICES TO GAIN RESOURCE EFFICIENCY IN THE BUILDING AND CONSTRUCTION SECTOR, CONTRIBUTING TO THE TRANSITION TOWARDS AN URBAN HABITAT WHICH IS SUSTAINABLE AND AFFORDABLE FOR ALL

THE goal of the programme is to push for effective policies to green the building sector and increase awareness about 'green' buildings. India is yet to build over 60 per cent of its future building stock. The challenge is to build new, which is efficient, sustainable, affordable and comfortable for all. The priority intervention, therefore, must ensure that new buildings and appliances meet stringent efficiency standards and targets, and utility reforms accelerate retrofitting, behaviour change and rapid turnover of existing buildings and appliances. The programme has also launched an initiative of greening architecture education with the aim of integrating green features and sustainability courses into the curricula in architecture institutions.

Working with regulators for effective energy code for buildings (ECBC)

The programme pushes for a more broad-based application of resource and energy efficiency measures, alternative technologies, fiscal measures and design innovation in the building sector. CSE has contributed to steering the debate on green-rated buildings and in taking it beyond design to performance.

CSE's inputs led the Indian Green Building Council and Delhi Development Authority to alter their practices to emphasise on performance and delivery. CSE's detailed critique of the Energy Conservation Building Code was shared with the Bureau of Energy Efficiency (BEE). The agency has initiated a revision of the code and the amended ECBC draft has included several suggestions made by CSE.

These include reducing WWR from 60 per cent to 40 per cent to reduce use of glass in facade; setting a temperature threshold for designing HVAC to prevent energy penalty; introduction of Energy Performance Benchmark that mandates operational energy efficiency to be set at a minimum 3 star of BEE star rating; introducing building categories of ECBC compliant, energy efficient, and super energy efficient; and tightened norms for heat transfer in buildings, among others.

Shattering the myth of star-rated ACs

CSE commissioned an independent National Accreditation Board for Testing and Calibration Laboratory (NABL)-accredited laboratory to test Room Air Conditioner units. The study found that the so-called '5-star' rated split AC becomes energy-inefficient as soon as the temperature soars over 40°C. In fact, it becomes worse than a 2- or 1-star rated AC. Results of the study showed that:

- A 5-star RAC is supposed to save 20-22 per cent of your energy cost compared to a 1-star RAC, claims the Bureau of Energy Efficiency (BEE). But the CSE study showed that in peak summers, when temperatures are in the 40-50°C range, a 5-star RAC can start consuming 10-28 per cent more power than its declared capacity

- Cooling capacity of room ACs also drops by about 30 per cent in peak summers, which means a 1.5-tonne AC acts like a 1-tonne AC

- Energy efficiency further deteriorates when users lower the room temperature artificially to levels below 27°C.

Research and studies carried out by CSE have been instrumental in catalysing change. In July 2016, CSE released its study on labelling used in popular air conditioners. Following the release of the study on impact of outdoor temperature on energy efficiency of air conditioners, the Bureau of Energy Efficiency issued a press release to state that they are changing the testing methodology of window ACs to address this concern that will be implemented from 2018. BEE has since then revised its guidelines and introduced a new star rating methodology called ISEER, based on testing on different temperature range for inverter ACs. BEE has also acknowledged the study and included CSE in their committee on new standard for ACs.

Trainings for government construction agencies

CSE worked with the country's largest government works contractor, the Central Public Works Department (CPWD) and key construction agencies of the government such as NBCC India Ltd. to build capacities of its staff on sustainable building policies and practices.

Influencing state governments to move towards a green built environment

Andhra Pradesh State Pollution Control Board, which is responsible for developing all environment related guidelines for the state, invited CSE to help develop a comprehensive sustainability rules and guidelines for built environment to be integrated with the building bye-laws.

Greening architecture education

The programme works closely with colleges and institutions to integrate green features and sustainability courses into the curricula of architecture educational institutions. The programme has been successful in creating an extensive network and platform of green building professionals, including architects, engineers, researchers, and policymakers, among others.

Bureau of Indian Standards (BIS) for C&D waste

CSE has helped catalyze the setting up of a BIS committee to revise standards for aggregate and concrete to allow reuse of construction and demolition (C&D) waste in concrete mix. CSE submitted its research-based recommendations for handling of C&D waste in Indian cities to the Union ministry of environment, forest and climate change, and the ministry's draft regulation on C&D 2016 includes many CSE recommendations.

RENEWABLE ENERGY

CSE's Renewable Energy programme is designed to accelerate the deployment of renewable energy and strengthen energy access for the poor by designing relevant policies and programmes especially for decentralised, off-grid clean power options. The co-benefits of moving to renewable energy sources in a climate challenged world are immense—energy security, climate protection, reduced pollution and health benefits.

However, challenges to upscale remain. There is urgent need for a long-term plan to move from subsidy, incentives and tax exemptions and allow renewable energy to reach grid-parity, and most importantly, to play a role to provide access to large numbers of energy poor.

The programme's policy research centers on promoting decentralised renewable energy (distributed, grid-interactive mini-grids) to enable energy access for the poor. Research supports the need for robust regulatory and fiscal mechanisms to ensure large-scale adoption and viability, and plays an important role for policy and regulatory oversight. CSE's approach brings together the energy access agenda often associated with conventional energy, with the renewable energy agenda that has climate benefits, to help catalyse a transition to clean energy.

Despite being the sixth largest producer of electricity in the world, India has managed to electrify only 67 per cent of its rural households. The programme builds on policy opportunities – such as India's target of 175 GW of electricity through renewable energy by 2022, as well as the country's support for the 'international solar alliance' -- to upscale the deployment of renewable energy in India and in the energy starved global South.

In India, the programme conducts research on available renewable energy choices, and assesses on-ground implementation of solar, wind and biomass energy to meet the country's ambitious national action plans and targets. The programme's policy research centres on promoting decentralized, distributed renewable energy to enable democratized energy access for the poor. Research supports the need for robust regulatory and fiscal mechanisms to ensure large-scale adoption and viability. It also plays an important watchdog role for policy and regulatory oversight.

TO ACCELERATE GROWTH OF RENEWABLE ENERGY AND ENERGY ACCESS FOR THE POOR THROUGH POLICIES AND PROGRAMMES, ESPECIALLY FOR DECENTRALISED, OFF-GRID CLEAN POWER OPTIONS
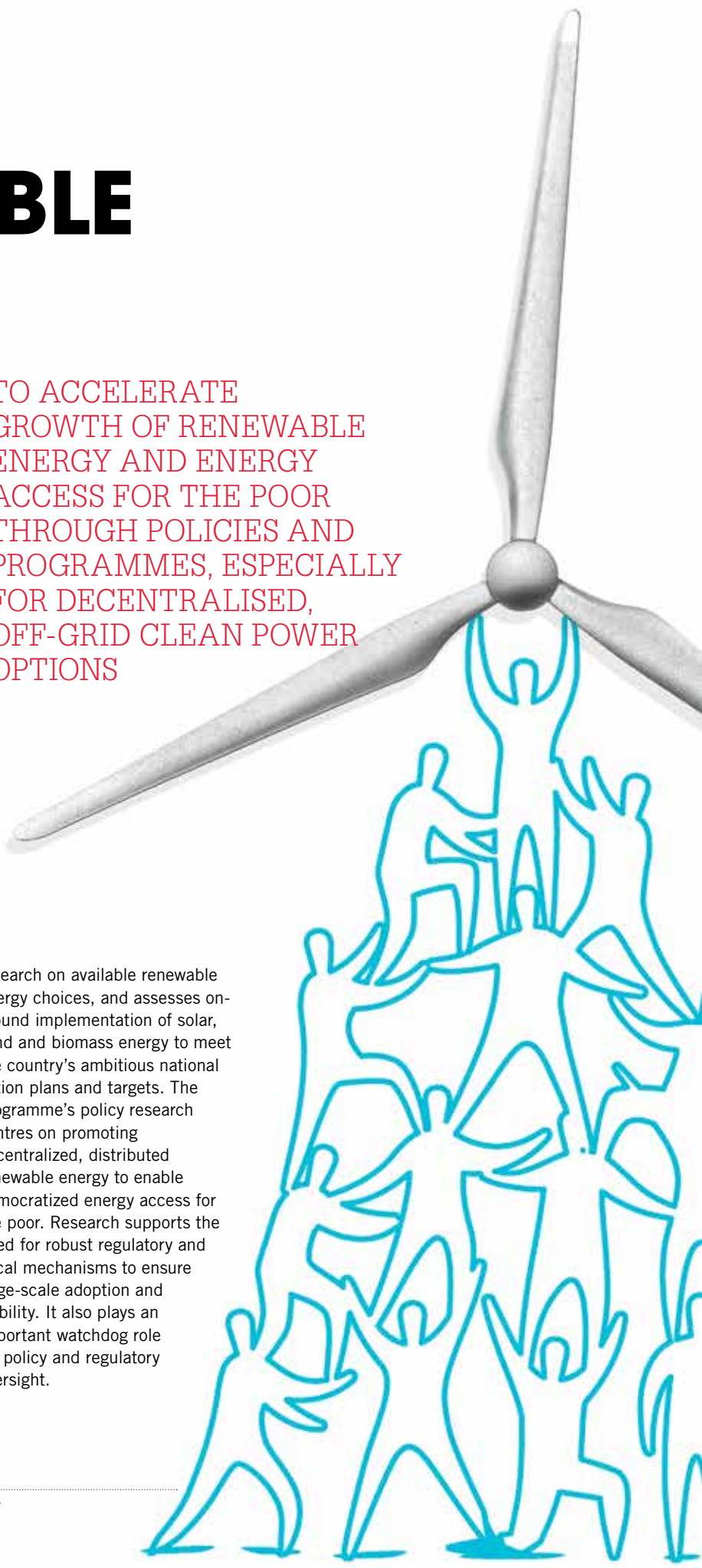
Mini-grids

CSE was part of a three-member committee that worked with the Union ministry of new and renewable energy to draft India's 'National policy for Renewable Energy based Micro and Mini grids', a first of its kind policy for the country. The policy mainstreams RE-based mini grids to enhance access to affordable energy services and help strengthen local economies.

As part of this effort, CSE's report, ''Mini-grids: Electricity to all', outlined a model to operationalise the draft national mini-grid policy, including private sector involvement to meet the electricity needs of local households and commercial electricity demand efficiently by generating power at the source of consumption. CSE is now working in Uttar Pradesh to improve the implementation of the mini-grid policy.

Rooftop solar vs DG

This component of the programme is predicated on India's natural advantage in receiving solar irradiation of 4-7kWH per sq meter per day for 300 days a year. The programme has identified policy and implementation gaps to influence national-level policies and regulatory practices to mainstream solar rooftop technologies to effect an affordable and sustainable transition to renewable energy. It is designed to help the country achieve the ambitious national target of 40 GW of electricity generation from rooftop solar by 2022.

CSE's policy brief, 'Solar Rooftop: Replacing Diesel Generators in Residential Societies' outlines options for residential areas to transition to solar rooftop energy. CSE has estimated that up to 3 GW of solar rooftop can be installed on new residential societies over the next five-seven years.

A web-based rooftop solar calculator provides information required for domestic consumers to install a solar plant on rooftops. The calculator covers the entire country and information is made accessible by area pin codes, and helps consumers design the system based on their electricity requirement.

Interventions in the global South

CSE's global efforts center on creating global feed-in tariff model and build a strong coalition and a common framework in the global South to make clean, decentralized energy more affordable and to enable its rapid uptake across the energy-starved developing world.

CSE's model, Global Renewable Energy and Energy Access Transformation (GREEAT), proposes a globally-funded renewable energy regime to catalyse and potentially transform energy access through clean energy sources in poor countries. GREEAT has been well-received world over and fits in well with the investment goals of Green Climate Fund. Friends of the Earth International formally joined hands with What Next Forum and CSE to support GREEAT principles to promote energy access through renewable energy.

Today, key aspects of GREEAT have been incorporated as part of the Africa Renewable Energy Initiative (AREI) under the Paris Agreement, for which CSE had worked with multiple partners across the world. As part of its engagement on pushing GREEAT / AREI, the programme is working with Ministry of Energy and Minerals (MEM) Tanzania, to bring more renewable energy sources in the country's electricity mix. CSE will be working with MEM in developing Tanzania's Renewable Energy Action Plan, which is geared to make Tanzania the first country in Africa to draft its electricity and clean energy policy based on the AREI principles.

ENVIRONMENT EDUCATION

TO FOSTER ENVIRONMENTAL LITERACY AND MEANINGFUL ENVIRONMENTAL EDUCATION AMONGST SCHOOL AND COLLEGE STUDENTS BY MOVING BEYOND THEORIES AND TEXTBOOK KNOWLEDGE TO 'KNOWING BY DOING'

THE Green Schools Programme (GSP) engages with school and college students, teachers and green educators to impart an understanding of environment-development linkages and to provide easy-to-use tools to help put in practice what is learned. GSP also offers a platform and a network of educators to catalyse cross-learning on the best green practices from different educational institutions, and on building education tools for environmental learning.

Green Schools Programme

A cornerstone of the programme is the Green Schools Audit, which provides teachers and students the methodology and tools to audit the resource consumption practices and green infrastructure in schools and assess themselves as environmental managers. The audit helps plug the gaps that are identified, and supports select schools to transition to greener campuses and sustainability behaviour. The programme also helps build capacities of educators by designing educational toolkits and other pedagogical interventions in schools and colleges to teach this highly interdisciplinary subject.

- The programme scaled up significantly, with 2514 schools that joined the GSP network, covering all 29 states and 5 Union Territories of India.

- The programme received over 2514 school registrations, of which 700 submitted the audit and 10.14 per cent were rated green.

- The programme forged partnerships with seven states and Union Territories – Punjab, Sikkim, Goa, Delhi, HP, Odisha and Chandigarh, and five foundation schools (CSI, Montfort, KVS, Zee, Bharti Foundation) in 2016-17. GSP also partnered with Jawahar Navodaya Vidyalaya (JNV) to launch the GSP audit across 100 JNV schools from Uttarakhand, Uttar Pradesh, Delhi, Haryana, Jammu & Kashmir, Rajasthan and Punjab.

- More than 20 workshops helped build capacities of 900 teachers from 713 schools in the year. Workshops helped teachers and educators gain an in-depth understanding of the interdisciplinary approaches and perspectives of sustainable development, sustainable environmental policies, politics and practices.

GSP Gold Schools

The programme handheld 10 schools in Delhi to help them implement prudent water conservation measures and reduce water consumption on their campuses. GSP 'Gold Schools' focused on rainwater harvesting (RWH) with the aim to make these select schools water-neutral by 2019. RWH structures were built in five schools, together with visual posters and collateral on the green practices followed by these partner schools.

Prakash Javadekar, Union minister for human resource development conferring Green Schools Award 2016 to Raley Junior High School, Gangtok, Sikkim

GREEN SCHOOLS AWARDS – RECOGNIZING THE GREENEST SCHOOLS IN INDIA
The Green Schools Award in Delhi recognized the top 10 schools from across India. The winning schools were selected after an extensive audit of their environment-friendly practices. Winners included schools from Punjab, Haryana, Karnataka, Kerala, Delhi, Sikkim, Rajasthan, Jharkhand and Madhya Pradesh. Union Human Resources Development Minister Prakash Javadekar presented the awards at a ceremony in New Delhi.

http://www.greenschoolsprogramme.org/schools/gsp-award-2016-2017/agenda-2016-17/>

GREEN SCHOOLS AND GOOD FOOD
As part of CSE's advocacy on Good Food, GSP conducts activities in schools to help schools engage with a wode range of issues, including organic food, food safety, junk foods and nutrition.

- **Partnership with IHE:** CSE collaborated with Department of Food Nutrition from the Institute of Home Economics to carry out study on BMI monitoring in seven GSP Gold schools, calculate BMI-for-age-Z (BAZ) scores and also to deliver talks on nutrition. The survey found that 36 to 52 per cent of the students were obese or overweight and the reports were shared with the schools. There is demand from some schools for BAZ scores to be integrated in the bi-annual health checkups of students.

- **Canteen Menus:** Menus of eight GSP Gold schools were reviewed by experts. Guidelines and a list of alternative traditional and seasonal foods was given to the schools to replace fried foods and packaged beverages, for instance replacing white rice, wheat and sugar with healthier options such as millets, raggi atta and jaggery.

- **Organic Farmers' Markets:** Organic Farmers' Markets were organised in three schools to create awareness on healthy eating and moving away from ultra processed packaged foods. Talks provided a cohesive overview of the food cycle and tips on urban gardening.

College programme

The programme has designed two specific interventions, a month-long interdisciplinary course for college level students and young development professionals, as well as a knowledge conclave that promotes a network for faculty and environmental educationists.

Knowledge conclave for green educators

The 2017 knowledge conclave for green educators in New Delhi drew the participation of 96 faculty members drawn from 26 states of India. The event served as a useful platform for faculty to share experiences on pedagogical approaches, and also provided educators access to CSE's vast network of scientists, activists, policy makers, researchers. An 'Environmental Reader for Universities' was released at the event, which closely follows the UGC syllabus for environmental studies for undergraduates.

Agenda for Survival

This interdisciplinary month-long summer certificate course on environment and development issues allows participants to understand and critically evaluate issues that lie at the interface of environment and development- poverty, democracy, equity and justice. Twenty-three students and young professionals were selected to attend the summer course. An experiential excursion to Jim Corbett National Park and Chinoni in Uttarakhand helped participants experience first-hand critical environmental challenges. Participants published a magazine, 'Re Wild', in which the articles drew from field visits to cover grassroots led eco-restoration efforts, agricultural crisis in the hills, human- animal conflict and its link to warming climate.

FORESTRY FOR LIVELIHOODS

MAINSTREAM COMMUNITY-LED CONSERVATION INTO OFFICIAL FOREST MANAGEMENT AND GOVERNANCE FOR LIVELIHOODS

THE programme also explores opportunities to make optimum use of forest financial instruments such as the 'compensatory afforestation' mechanisms. Research is also geared to tap into global resources for channelizing benefit to forests in India, especially the REDD+ scheme under the UNFCCC process. It rides on intervention opportunities presented by policy, legislative and judicial initiatives that have the potential to change the forests governance landscape of India remarkably, directly addressing biodiversity concerns and impacting the livelihoods options of close to 275 million of the forest-dependent poor.

Policy watchdog on forest regulations

The programme engaged with the Union ministry of environment, forest and climate change and other key stakeholders in the country on how to spend the massive ₹40,000 crore collected as 'compensation' for diverting / cutting down forests for development projects.

Efforts to make the Compensatory Afforestation Fund (CAF) more balanced in representation and beneficial for the forest dependent communities has emerged as a key focus area of the programme, as the government is set to unlock the approximately ₹40,000 crore in already collected, with about ₹6000 crore being added each year. If deployed prudently, the fund is potentially transformative for forest-dependent communities and will increase the ability of forest-rich states to work for poverty alleviation, conservation, and for climate change mitigation and adaptation.

CSE's recommendations were included in the fund's parent legislation, Compensatory Afforestation Fund Bill, 2016. The programme is now providing its recommendations in the formulation of the Compensatory Afforestation Fund Rules under the CAF Act 2016. CSE's research was discussed in Parliament, and the government assured Members of Parliament that concerns raised by CSE would be addressed.

Forest productivity

CSE's reports, factsheets, articles and newsletters helped build dialogue on solutions to wood productivity and forest governance faced by forest-dependent communities. Reports on Forest Development Corporations (FDCs) and inputs to the Union ministry of environment forest and climate change guidelines on degraded forests pushed community-led farm forestry as a viable alternative to the government's proposed privatisation of degraded forests in India. The privatisation move has been stalled for now by government, which marks a major relief to the livelihoods of forests-dependent communities.

CAMPA

CSE's advocacy on how the government spends the massive ₹40,000 crore collected as 'compensation' for diverting / cutting down forests for development projects was discussed in Parliament. CSE's advocacy promoted community participation in the planning and oversight of spending the funds collected under the government's Compensatory Afforestation Management and Planning Authority (CAMPA) scheme; The 'rules' of CAMPA are now being framed and the final rules are awaited.

Building global South's position on REDD+

CSE's efforts are directed to generate debate on how complex forest governance setting in India and Africa can make way for a REDD+ regime which safeguards forest dependent communities, incentivizes them for their conservation efforts and meets their resource needs.

A workshop in February 2017 convened key stakeholders from the region – government officials, agencies running REDD+ pilot projects in India, multilateral and bilateral agencies, NGOs and forestry experts, which helped map the state of play in the sector in India and south Asia.

CSE also engaged with global platforms such as the Oslo REDD Exchange Conference in Norway in June 2016, and prepared a policy brief that will be presented at the next climate CoP at Bonn.

A media fellowship was awarded to 10 working journalists from eight African countries; the ensuing coverage and case studies, articles and multimedia pieces were published, representing diverse experiences and reportage on forestry and REDD+ from across Africa.

Bamboo nursery under REDD+ scheme in Madagascar. Photo by Rivonala Razafison

COMMUNICATION & OUTREACH

The key principle governing CSE's communication initiatives is to leverage all existing communication mediums, methods and communities for effective outreach and environmental advocacy. The Centre primarily does this through its conversations with media from across Asia and Africa, with the CSE Media Resource Centre and the Environmental Intelligence Services playing key roles.

The Media Resource Centre facilitates wider discussions and public debates on environment and development-related issues through a combination of tools including weekly press releases, media alerts, Facebook Live programmes and webinars, newsletters, press conferences on key issues, and social media posts. Besides, it also manages and curates specific capacity building programmes for journalists through media fellowships and grants, briefing workshops, and training sessions. Among the new initiatives, the Centre is planning is a Hindi feature service, which will give language journalists access to environment-development news and resources.

1. Vrishti, a paean to rains. To mark 25 years of Down To Earth, a unique jugalbandi was organised between Manganiyaar folk musicians from Rajasthan, India's top monsoon scientist and the civil society. Delhi, September 2016.

2. A Facebook Live session in progress in the TV-DTE studio. Delhi, August 2017.

3. Amitabh Ghosh in conversation with Sunita Narain on his book on climate change, The Great Derangement. Delhi, July 2016.

Environment Intelligence Services

CSE's Environment Intelligence Services is an environment research and data services provider for the global South. It organises, packages, visualises and delivers relevant, cross-tagged, timely and contextual environmental information, data and audiovisual content to a global audience.

It documents environmental news and data covering the global South from 75 national and international newspapers, magazines and news websites. In 2016-17, CSE conducted five trainings for 166 for journalists, NGOs and development communicators on new media and information management. Close to 1.2 million people visited the Portal in 2016-17 to download 72,043 studies, policies and research reports. The portal was cited in more than 170 research papers globally.

4. CSE's first appearance at the Jaipur Literature Festival. The State of India's Environment annual was released here. Jaipur, January 2017.

5. A media briefing in progress. Delhi, June 2017.

6. Down To Earth in Hindi being introduced to Patna at a media interaction. Patna, August 2017.

ANIL AGARWAL ENVIRONMENT TRAINING INSTITUTE

TO FIND APPROPRIATE AND AFFORDABLE SOLUTIONS TO SOME OF THE MOST PRESSING PROBLEMS FACED BY DEVELOPING COUNTRIES

AAETI is a learning, training and innovation centre designed to find appropriate and affordable solutions to some of the most pressing problems faced by the global South, from climate change, air pollution and urban mobility to water and waste management, sustainable industrialisation, urban growth and environmental degradation.

The institute has been named after the late Anil Agarwal, CSE's founder-director and a leading figure in India's environmental movement.

State-of-the-art training programmes bring together expertise, knowledge, cutting-edge research and innovative learning tools from across India to build capacities of a range of audiences – regulators, lawmakers, communicators, professionals, students, civil society members and administrators.

AAETI currently functions from its temporary facilities in New Delhi, where CSE – its parent body – is based. The Institute's new campus, which will be inaugurated in November 2017, is located in Alwar district of Rajasthan, two-hour drive from Delhi.

Core areas of capacity building

CAPACITATE AND SUPPORT PUBLIC INSTITUTIONS, such as regulatory agencies in the frontline of enforcing environmental rules, monitoring, enforcement and compliance. Work closely with urban planners, municipal engineers and urban local bodies to help them tackle the effects of a rapid scale-up of urban infrastructure—water, solid waste, river pollution, sanitation and housing.

STRENGTHEN THE ABILITIES OF ENVIRONMENT MANAGERS by working with public and private sector enterprises and industry bodies to influence them on making correct choices and pushing sustainable practices.

BUILD POWERFUL MULTIPLIERS IN SOCIETY by working with influential change agents in society such as NGOs and CBOs to build local know-how and to explore viable, cost-effective solutions to help communities tackle pressing challenges.

CREATE A FUTURE-READY CADRE OF CHANGE AGENTS – engage with students, teachers and the youth to promote holistic understanding of sustainable practices and wise environmental decision-making and prepare them to intervene effectively in the decision-making process.

BUILD EFFECTIVE COMMUNICATION AGENTS to present reason and analysis to influence the public agenda on sustainability, and to integrate the vital concerns that affect the lives and livelihoods of millions into the national debate

The new green campus: Learning, demonstration & training centre

AAETI's new 'green' campus is coming up on a beautiful 11-acre wooded area in the foothills of the Aravali in Nimli, Alwar (Rajasthan), just a little over two hours' drive from Delhi. It has residential and recreational facilities for about 150 people, including students and staff.

A zero-waste, water and energy positive facility, AAETI is designed to demonstrate that it is possible to build one of the country's 'greenest' campuses without extravagant spending. Five key areas have been identified to meet green campus goals – site planning, material selection and construction, energy use, water management and waste management.

CSE teams have worked in close collaboration with sector specialists and consultants to establish campus performance parameters and targets that have been actively monitored during construction, and once the facilities are operational. Model projects on the site will allow training participants to explore technologies on water harvesting, wastewater treatment and renewable energy.

Civil construction work for most

The new campus will be inaugurated in November 2017

buildings on the site is now complete, as are the green campus features. The trainings, now being conducted on CSE's main premises in New Delhi, will shift to the new facility from November 2017. The AAETI campus has been supported by reputed national and international organisations. The Department of Science and Technology, Government of India has provided funds to make AAETI a model project for water and waste management. Other organisations such as HSBC Bank (India), the Bill & Melinda Gates Foundation, Bread for the World and Maitri Foundation, have provided support to build the infrastructure and the teaching and learning facilities.

Campus highlights

- State-of-the-art training rooms to host 100 trainees at a time
- A 200-seater conference hall
- Residential campus with 25 double and 22 single rooms to accommodate about 70 trainees at a time
- Housing facility for 20 teaching & research staff
- A canteen to serve 100 people at a time
- India's first referral lab on septage management
- Model projects on rainwater harvesting, wastewater treatment
- A water interpretation centre

Six schools

AAETI WILL CONDUCT ITS COURSES ON THIS CAMPUS THROUGH SIX SCHOOLS OF LEARNING. THE FACULTY WILL COMPRISE SOME OF THE FOREMOST EXPERTS IN THEIR FIELDS – FROM INDIA AND OTHER COUNTRIES.

1

SOUTHERN CENTRE ON CLIMATE CHANGE
To promote low carbon growth strategies, mainstream climate co-benefits, and build resilience of the poor to better cope with climate change

2

SCHOOL OF WATER AND WASTE MANAGEMENT
To push water literacy, establish policy principles and affordable, sustainable and innovative technologies for a less wasteful and water-prudent society

3

SCHOOL OF ENVIRONMENTAL GOVERNANCE
To train environment regulators on pollution management, monitoring and compliance; help industry adopt resource-efficient and pollution prevention technologies and practices

4

SCHOOL OF SUSTAINABLE URBANISATION
Designed to help address the growing demands of urbanisation and to address the challenge of building cities for the 21st century that are low carbon, resource- efficient, accessible, and affordable for all

5

GREEN COMMUNITY COLLEGE
To provide practical, hands-on skills to create a future-ready workforce for green jobs.

6

SCHOOL OF ENVIRONMENT COMMUNICATION
To capacitate communication professionals to build informed public opinion to influence change

Executive Board

M S Swaminathan

is one of India's foremost agricultural scientists and is best known as the scientific leader of the "evergreen revolution movement" in India.

His pioneering work in the field of agricultural science and food security has earned him several awards, both national and international, the Padma Shri, the Padma Bhushan, the Padma Vibhushan, the Ramon Magsaysay Award, the World Food Prize, the Tyler Environment Award, to name only a few.

He has held several distinguished positions, including Direcor General of the Indian Council of Agricultural Research and of the International Rice Research Institute, and Secretary of the Ministry of Agriculture and Cooperation.

William Bissell

has been closely associated with the Centre for Science and Environment for many years He is the Managing Director of FabIndia, a company that has made a signal contribution in popularising handlooms, nationally and internationally.

He is deeply interested in issues of environment and sustainable development. Besides CSE, he is also involved with other non-profit organizations. William Bissell is the Managing Trustee of the Bhadurajun Artisan Trust, which runs schools in Rajasthan to bring quality education to the artisanal families living in rural areas.

G N Gupta

joined the Board of CSE in 1998 and is one of the core group that provides guidance on institutional development issues, particularly on financial issues.

As a member of the Indian Revenue Service, he has held several key positions in the revenue department of the Ministry of Finance. He served as the Chairman of the Central Board of Direct Taxes, India's highest tax making body, and also as a Director in the Planning Commission. He currently serves on the Board of several companies and offers consultancy services on issues related to direct taxes.

N C Saxena

was a senior official with the Government of India and he served in various capacities in his long and illustrious career. He was with the Government of India as Secretary,

Planning Commission (1999-2002) Secretary, Rural Development (1997-99), and Director, LBS National Academy of Administration, Mussoorie (1993-96). Earlier he was Visiting Fellow, CIFOR (Center for International Forestry Research, Indonesia, 1994-95 and worked on Sustainable Forest Management.

The Rockefeller Foundation awarded him a Senior Post-Doctorate Fellowship to do research at the University of Oxford 1989-92, He is a member on the editorial boards of International Forestry Review, Oxford, and Food Policy, Amsterdam.

He is also a Member of the Royal Swedish Academy of Agriculture and Forestry, Stockholm, and Member, ADB Institute Advisory Council, Tokyo. On behalf of the Supreme Court of India, Dr Saxena monitor food based programmes in India. He now consults to a number of organisations on a range of issues.

N. J. Rao

has done B.Tech (Hons.) and M.Tech in Chemical Engineering from IIT Kharagpur and Ph.D. in Chemical Engineering from University of Roorkee. He served over 34 year's at IIT Roorkee / University of Roorkee at Chemical Engineering Department and Department of Paper Technology. He worked for several years as Director of Institute of Paper Technology. He was the Director of Central Pulp and Paper Research Institute, a national laboratory under Ministry of Industry (GOI) for one year. He has published over 160 research papers and 8 Ph.D. scholars got their degrees under his guidance. He has several awards for best papers and best teacher and is associated with several National and International bodies like UNEP(NIEM), CPCB, NPC, MOEF, DST, CSE, HNL, Shreyans Industries Ltd., WBCSD, IL & FS. Currently he is the Vice Chancellor of Jaypee University of Engineering and Technology, Raghogarh, Madhya Pradesh.

Mahesh Krishnamurthy

a Bachelor of Computer Science from IIT, Mumbai with a Masters in Computer Science from the University of Wisconsin, and Masters in Business Administration from Stanford University, Mahesh worked for 18 years in different industries in the United States including as Head of Corporate Development at Accelrys and General Partner at Idanta Partners before joining IVFA. He also worked for KT Venture Group, a corporate venture capital fund sponsored by KLA-Tencor, McKinsey, AT&T and Honeywell.

Bharati Chaturvedi

is an environmentalist and writer. She is the founder and director of Chintan Environmental Research and Action Group. Bharati has served on various committees of the Government of India - the Expert Committee on Plastic Waste, set up by the Ministry of Environment and Forests to finalize rules for plastic waste handling, and a Task Force for social security for the informal sector, set up by the Ministry of Labour and Employment. She has also been involved in consultations about the Indian government's Hazardous Waste Strategy and Electronic Waste Rules.

Bharati has a Master's degree in history from Delhi University, and a Master's in international public policy from the School of Advanced International Studies at Johns Hopkins University. She is a Leadership in Environment and Development (LEAD) Fellow and has previously received the Sarai Urban Fellowship. She also serves on the board of several non-profit organizations in India.

A K Shiva Kumar

is a development economist and professor. He teaches various courses at Harvard University, Indian School of Business and Young India Fellowship. He served as the Director of the International Centre for Human Development, New Delhi. In addition to serving as an advisor to UNICEF – India, he was a member of India's National Advisory Council. He is recipient of the MacArthur Fellowship, Mason Fellowship, and the Certificate of Excellence in Teaching from Harvard University.

Sunita Narain

has been with the Centre for Science and Environment since 1982. In her years at the Centre she has worked both to analyse and study the relationship between environment, development and to create public consciousness about the need for sustainable development.

Her research interests range from global democracy, with a special focus on climate change to the need for local democracy where she has worked on forest-related resource management and water issues. She serves on the boards of different organisations and on governmental committees and has spoken at many forums across the world on issues of her concern and expertise.

Sunita Narain has devoted a great deal of her time to develop the management and financial support systems needed to make CSE strong and sustainable. She has greatly contributed to the institution of management systems that ensure that CSE produces quality work consistently.

Chandra Bhushan

is currently the Deputy Director General of CSE. He is a distinguished expert in the field of natural resource management, environmental geo-politics and industrial pollution. He has a diverse and distinguished track record in research, writing, management and policy advocacy. Chandra Bhushan has researched and written about issues ranging from industrial pollution to energy and climate change and from water crisis in Indian sub-continent to political economy of natural resource extraction . His academic qualifications include bachelors in civil engineering and masters in environmental planning and technology.

Jagdeep Gupta

is currently the Executive Director, Planning and Operation. She brings in a rare and befitting mix of pure science background with a degree in management, aptly needed to understand the nature of work and the ethos behind an organization like CSE. Over the years she has shown her excellence in acquiring the best talents, developing a wholesome system of monitoring the research outcomes, provide the best infrastructural facilities, develop a wide array of important contacts and widen the outreach of CSE's research publications. Her main forte has been her human management skills, which gives her edge over others to handle problem situations in a balanced and unbiased approach. Needless to say, it requires lot of grit and tenacity to manage so many divergent verticals, which she does with immense ease. She stands as a strong pillar with huge institutional memory and has great contributions to the growth of CSE in many different ways.
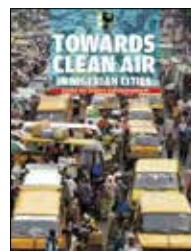
Key CSE publications: 2016-17

1 **Not in my backyard:** Solid waste management in Indian cities

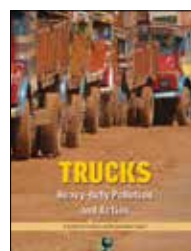**2** **Not handled with care:** A survey of biomedical waste practices in Jharkhand
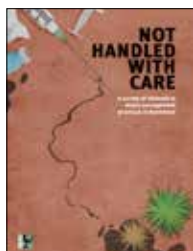
3 **Towards clean air in Nigerian cities**

4 **Urban air quality management in Ethiopia**

5 **Legal framework for clean air in cities**

6 **Trucks:** Heavy-duty pollution and action

7 **Towards a clean air action plan:** Lessons from Delhi

8 **Parking policy for clean air and liveable cities:** A guidance framework

9 **A clean air tool for cities**

10 Reinventing air quality monitoring

11 **Diesel:** On the toxic trail of devil's engine
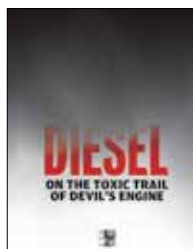
12 **Children in the chulha trap:** Eliminating toxic exposure in anganwadis of Bihar
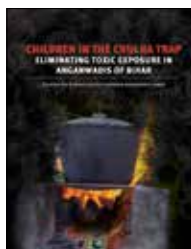
13 Bioscope of Piu & Pom
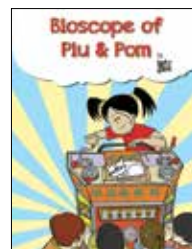
14 **Unlocking forests:** Does CAF Bill 2015 offer enough?

15 **The puzzle of forest productivity:** Are FDCs in India solving it right?

16 **E-book: Clean up your act:** The state of sanitation in India

17 The crow, honey hunter and the kitchen garden

18 Mainstreaming rainwater harvesting in Noida
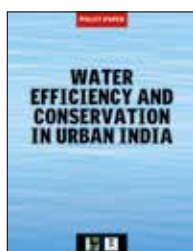
19 Urban water efficiency and conservation

20 Policy brief on bromate lab study

21 Environment Reader for Universities

22 Task force report on CEMS training-cum-exposure visit to Germany

23 Using the National Clean Energy Fund to clean coal power plants
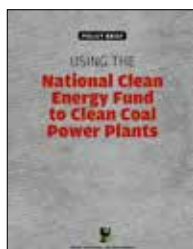
24 **Not as cool–** Ensuring real world energy savings from air conditioners

25 **First Food:** Culture of taste

26 **Antibiotic use and waste management in aquaculture**

27 **Food labelling, claims and advertisements**

28 **CSE recommendations on the FSSAI Draft Regulations for Insecticides and Antibiotics**

29 **State of India's Environment (SOE) 2017**

30 **Strategic and operational guidance on animal and environmental aspects:** National Action Plan for Antimicrobial Resistance for Developing Countries

31 **Factsheet:** National Action Plan for Antimicrobial Resistance for Developing Countries
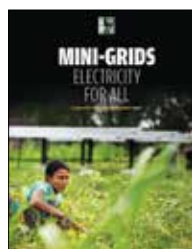
32 **Mini-grids:** Electricity for all

33 **Why I Should Be Tolerant:** On Environment and Environmentalism in the 21st Century (by Sunita Narain)

34 **Energy and energy access:** Northeast India
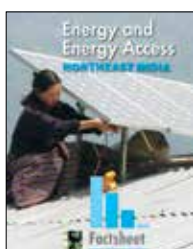
35 **Solar rooftop:** Replacing diesel generators in residential sectors
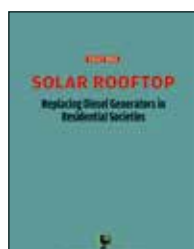
36 **Regulating small-scale mining of minor minerals**

37 **State of India's Environment (SOE) in Figures, May 2017**

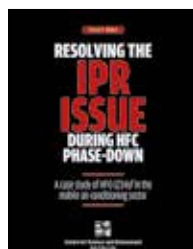**38 Reports on District Mineral Foundations**: Jharkhand, Chhattisgarh and Odisha
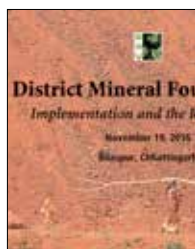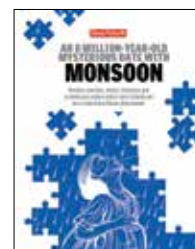
39 Environmental governance: Two years of the NDA government

40 Resolving the IPR issue during HFC phase-down

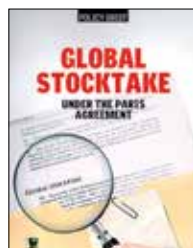**41 An 8-million-year-old mysterious date with the Monsoon**

42 Africa-Asia Conclave on loss and damage due to climate change, Nairobi – Proceedings

43 Need for a global agricultural insurance mechanism within UNFCCC

44 Global stocktake under the Paris outcome

45 Shutting old capacity: The 34-GW question

46 New environmental norms for the power sector: Recommendations

47 Clearing the air: Pollution-control technology for coal-based power plants

Training manuals & guidelines

1 Inspection Protocol: Compliance monitoring & enforcement for Indian industry

2 Training manual: Biomedical waste

3 Case studies: Green MBA

4 Be water wise: Manual for water audits in schools

5 Activity sheets: Good food for schools

6 Guidelines: Corporate Social Responsibility

7 Inspection manual: Large- and medium-scale mines

8 Inspection manual: Small-scale mines

9 Pro forma: Environmental contract for sand mining (Namibia)

10 Initial appraisal process: Sand mining in Namibia

CSE's India and Global Media Presence
(April 2016-March 2017)
Source: Press clippings

Number of clippings (newspapers & journals)	India	Global/south Asia
Air Pollution	534	461	73
Agriculture	06	06	05
Climate Change	123	105	18
Food Safety	175	165	10
Forests	07	07	00
Thermal Power Plants	08	08	05
Natural Disasters	22	22	00
Energy	50	45	05
Environment	60	57	03
Water	20	20	00
Solid Waste/Hazardous Waste	55	54	01
Sanitation	15	14	01
Other topics	106	98	08
	1,181	1,062	119
	Total	**India**	**Global/south Asia**

CSE's India and global media presence (electronic media)

Air Pollution	**449**
Agriculture	**01**
Food & Toxins	**186**
Climate change	**09**
Water	**11**
Sanitation & Waste Management	**15**
Forests	**13**
Energy	**01**
Miscellaneous	**22**
Total electronic media coverage	**707**

Institutional development

Human resources

CSE is today 170 people-strong organization drawing talent from 21 of the 29 states in India, which helps in introducing a regional perspective and cultural diversity to our workforce.

CSE talent pool

63% PhDs and PGs

20% Engineering

17% Graduates

Professional experience levels

7% Less than a year

20% 1-3 years

47% 4-10 years

27% More than 10 years

CSE maintains a healthy gender ratio, with 40% female against 60% male staff. CSE is also a young organisation, with about 84% of staff hired is up to 40 years' old. CSE's volunteer & Internship programme remains popular with students and young professionals. A total of 101 volunteers and interns worked with CSE in 2016-17 in various research and support teams.

Expenditure in FY 2016-17

22.30% Fixed Assets*

5.81% Programme Management & Development

11.14% Management Support

9.17% Sustainable Industrialisation

1.63% State of Environment

1.89% Health, Environment, and Pollution Monitoring

3.55% Environmental Education & Training

17.73% Environmental Information Dissemination

23.98% Environmental Research

2.81% Environmental Resources

*Includes AAETI

The Haagen-Smit Clean Air awardees with the Governor of California, Jerry Brown (fourth from left, standing to the right of Anumita Roychowdhury)

Awards & Recognitions

🎗 Anumita Roychowdhury (Executive Director, Research & Advocacy) was awarded the prestigious Haagen-Smit Clean Air Award for 2016 in the category of International Air Pollution Policy by the California Air Resources Board.

🎗 Sunita Narain awarded the Order of the Polar Star - Commander by the King of Sweden

🎗 Sunita Narain awarded the Rani Jhansi award

🎗 Sunita Narain was featured in Time magazine's '100 Most Influential People in the World'

🎗 Sunita Narain awarded by Sri Chukkapalli Pitchaiah Foundation

🎗 Sunita Narain received the V.C. Padmanabhan Memorial Award for Excellence in the category of "Ecology and Environment Conservation" instituted by Manappuram Finance Limited

🎗 The annual Global Go To Think Tank Index of the University of Pennsylvania in the US ranked CSE as among the developing world's most influential environmental think tank in 2015 and again in 2016

🎗 Down To Earth awarded the ISC-FICCI Sanitation Award in the category 'Media in Sanitation for 2016. The award was shared with NDTV

🎗 CSE awarded the Climate Change Communication Research in Action Award from The International Association for Media and Communication Research (IAMCR)

Sunita Narain's ideas have shaped some of the key debates of our time. A paper that she co-authored in 1991 remains to this day the foundational charter of the global climate-justice movement.

As an activist, Narain is a pioneer. She and the organization that she heads, the New Delhi–based Centre for Science and Environment, have been campaigning to reduce the Indian capital's dangerous air-pollution levels for almost two decades. Despite resistance from many quarters, some of their key recommendations have been embraced by the courts.

Narain has also consistently opposed the kind of elite conservationism that blames environmental problems on the poor. Instead she has advocated policies that recognize India's forest dwellers and indigenous peoples as essential custodians of their environments. Hers is a voice that urgently needs to be heard in this era of climate change.

- Citation by Amitav Ghosh
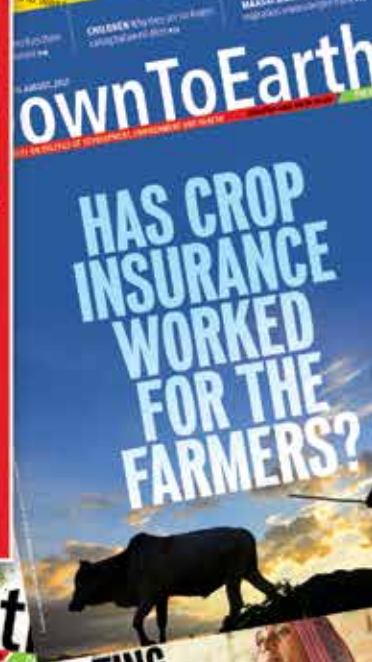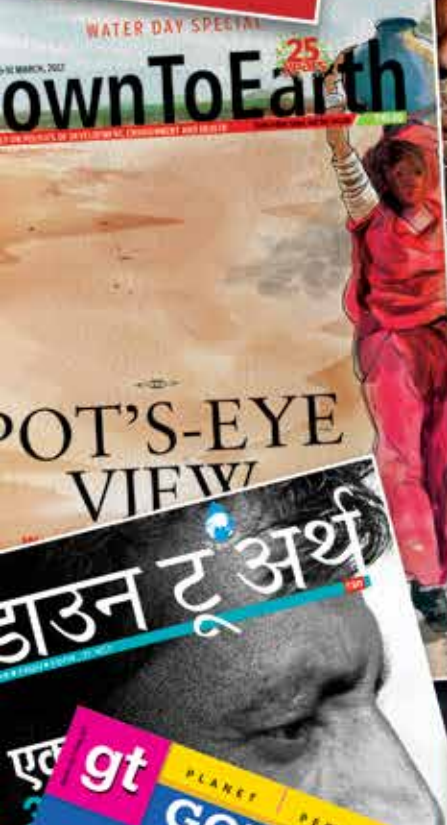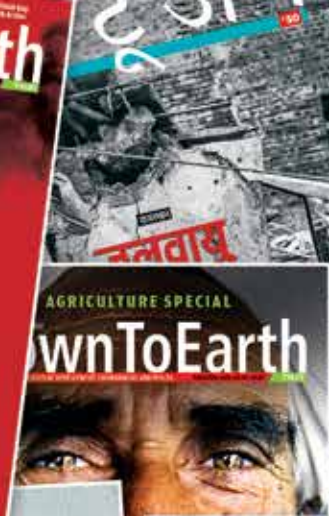*in Time magazine's '100 most influential people in the world 2016'*

Donors: 2016-17

We are grateful for the support of our institutional and programme donors, and to the many individual supporters.

Swedish International Development Cooperation Agency (SIDA)
Bread for the World
MacArthur Foundation
Oak Foundation
DanChurchAid
Hongkong and Shanghai Banking Corporation Limited (HSBC)
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