Cover Story
Evolution of Environmental Diplomacy from Global to National

World Environment Day
ONLY ONE EARTH

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World Environment Day 2022

The World Environment Day, celebrated on 5th June, is the largest global platform for encouraging awareness and action for the protection of the environment. This year the World Environment Day 2022 theme is - ONLY ONE EARTH, with the focus on “Living Sustainably in Harmony with Nature”. It includes the urgent need for actions towards a healthy planet and prosperity for all, achieving a sustainable and inclusive recovery from the COVID-19 pandemic, and accelerating the implementation of the environmental dimension of Sustainable Development Goals (SDGs). Also, the World Environment Day 2022 is a historic milestone for global communities as it commemorates the 50th anniversary of the Stockholm Conference (1972).

At a global level, India has announced to reach net-zero emissions by 2070 at the COP26 UN Climate Change Conference held in Glasgow. India is at the front in addressing climate actions and has adopted a multifaceted strategy to address climate instability and achieve the SDGs. The country has been ranked as a high performer in the Climate Change Performance Index 2020 on account of low levels of per capita emissions and energy use. Under the Nationally Determined Contributions (NDCs) of the UNFCCC, India’s climate action strategies emphasise clean and efficient energy systems, resilient urban infrastructure, and planned eco-restoration among others. Indian cities are highly exposed to climate risks and are critical sites of climate action. In India, the challenges of climate change and sustainable development are particularly critical. By 2050, 53 per cent of India’s population will be living in urban areas. There are cities which are experiencing an increase in extreme rainfall and exacerbated flood risk, precipitation decline, droughts, heatwaves, the spread of vector-borne diseases, and heat-related deaths.

Owing to the climate-related risks and vulnerabilities, urban local bodies (ULBs) have led to a focus on identifying and implementing climate change adaptation in cities. Many Indian cities such as Mumbai, Coimbatore, Rajkot, Siliguri, and Udaipur are developing climate action plans to adapt to increasing risks such as flooding and heat waves and to mitigate greenhouse emissions.

While the country is on track with regard to policy interventions, there is a growing need for developing solutions based on a sound understanding of sustainable development.

This issue is a compilation of six articles and an interview to mark World Environment Day, and accelerate actions towards achieving environment-related SDGs by 2030. The Sustainable Development Goals are integrated and balance the three dimensions of sustainable development (economic, social, and environmental). The interlinkages and integrated nature of the SDGs are of crucial importance in ensuring that the purpose of the New Urban Agenda and combating climate is realised.

NIUA is committed to contributing to Indian cities perform better. To achieve this objective, along with our own resources, we partner with media, industry, academia and other government and non-government organisations (NGOs) for effective research, capacity-building, and advocacy outcomes. The collaboration of the NIUA and eGov magazine is a demonstration of the same. Teams at NIUA and eGov magazine have enthusiastically worked to collate a diverse range of knowledge-base on the cross-cutting issues of climate change, technology and SDGs in India for this special issue. My sincere thanks to all the authors who have contributed to this special issue and shared their knowledge to make this issue possible.
One Earth, One Life...Save It!

From persistent extreme weather events to melting glaciers, our planet is changing before our eyes. With ecosystems and communities swiftly being devastated globally by environmental threats, the situation is grim. The effects of climate change are becoming increasingly visible.

The number of disasters has gone up by a factor of five over the 50-year period, driven by climate change, says a report by the World Meteorological Organisation (WMO). Global sea-level rise has accelerated to a new high in 2021, with continued ocean warming and ocean acidification. According to a report by Intergovernmental Panel on Climate Change (IPCC), global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate.

The need of the hour is to rigorously drive the change we need now - making this planet a more liveable place for us and future generations with sustainable choices. This is not an option, but an imperative that we take environmental threats more seriously to save humanity from mass extinctions, health disasters, and precarious climate-induced disruptions to society.

Over the years, there has been a consistent expansion of policies to move towards healthier, low-carbon societies; and proactive measures to protect the earth. The sustainable approach towards the protection of the earth is gaining currency in key sectors such as tourism, transport, agriculture, et al.

From the Plastic Free India drive to sector-specific programmes such as Swachh Bharat Abhiyan, Namami Gange Programme, Nagar Van Scheme, Mangroves for the Future (MFF), National Wetland Conservation Programme, National E-Mobility Programme, etc, the Government of India is undertaking various initiatives that resonate with its commitment towards saving the planet.

And World Environment Day on 5 June is a call for us to stand up and fulfill our responsibilities towards Mother Earth. Let’s pledge to save the planet!

This issue of the eGov Magazine, in partnership with the National Institute of Urban Affairs (NIUA), will highlight how India is mitigating the climate crisis, paving the way for a safe & healthy planet. It is a compilation of enriching articles and insightful interviews on the theme from senior policymakers, experts and academia.

Happy reading!

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Climate change and sustainable development are inseparable. Global warming is producing negative impacts on natural and human systems is impeding the progress towards SDGs. The ambitious climate goals and climate action plans produce new opportunities for the economy, environment and society. But, these are contingent upon national governments in adopting climate-resilient pathways into urban planning and practice, writes Hitesh Vaidya, Director, National Institute of Urban Affairs (NIUA).
India has been one of the key movers on the SGD agenda and has continued to make gains on SDG targets. The country’s overall SDG score improved from 60 in 2019 to 66 in 2020–21.

The SDG India Index 2020-21 indicates that there has been an increase in forest and tree cover in 14 States/Union Territories which include Andhra Pradesh, Chhattisgarh, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, Andaman and Nicobar Islands, Chandigarh, Delhi, and Jammu and Kashmir. Various tech-fueled initiatives such as Carbon Credits are helping to sink and offset India’s sizable carbon emissions, while also providing additional income. Indore is the first city in India to earn an income of ₹9 crore by earning about 70,000 carbon credits during the year 2020-21. Indore Smart City Development Limited (ISCDL) has engaged with over 30 cities on Aggregator Business Model for the Carbon Credit Monetisation. With more awareness, capacity building and scaling up processes, carbon credits could help India reach net-zero by 2070.

Additionally, the Ministry of Environment, Forest and Climate Change (MoEFCC) notified the Regulation of Persistent Organic Pollutants Rules on 5th March 2018.
under the provision of the Environment (Protection) Act, 1986. The regulation inter alia prohibited the manufacture, trade, use, import, and export of seven chemicals which were listed as POPs (Persistent Organic Pollutants) under the Stockholm Convention. Ahmedabad, Chennai, Gangtok, Kolkata, Mumbai, Rajkot, Siliguri, and Udaipur are some of the cities which have developed Climate Action Plans in meeting the objectives of the Paris Agreement.

Under the Ministry of Housing and Urban Affairs (MoHUA) various programmes such as Swachh Bharat, AMRUT 2.0, ClimateSmart Cities Assessment Framework, The World is looking to you COP26, etc. are at the core of the SDGs. However, degrading air quality index, rampant environmental degradation, loss of biodiversity, urbanisation in the Himalayas, loss of resilience in ecosystems, lack of waste management, depletion of resources (land, air, water), and growing water has challenged the progress towards sustainable development.

Climate change and sustainable development are inseparable. Global warming is producing negative impacts on natural and human systems and is impeding progress towards the SDGs. The ambitious climate goals and climate action plans produce new opportunities for the economy, environment, and society. But, these are contingent upon national governments adopting climate-resilient pathways into urban planning and practice.

NIUA is committed to aligning its programmes towards achieving the Sustainable Development Goals (SDGs). With a vision to build climate actions in cities, the Climate Centre for Cities (C-Cube) at NIUA focuses on synergising climate actions by:

a) Incorporating climate variability and climate change considerations in urban development
b) mainstreaming climate actions through improved collaborations with stakeholders, improved planning, infrastructure resilience, and monitoring impacts.

The Centre takes a four-step approach to enabling climate action:

i) Developing policy recommendations.
ii) Developing planning toolkits for cities to incorporate climate change considerations in land use planning, master planning, housing, and urban development.
iii) Implementing demonstrative local climate actions.
iv) Supporting the national programme related to climate change.

The Centre supported MoHUA in implementing the ClimateSmart Cities Assessment Framework (CSCAF) 2.0. CSCAF is a first-of-its-
kind national assessment framework on climate-relevant parameters for Indian cities. 126 cities participated in 2020-21 to assess their development in 28 indicators across five thematic areas – Urban Planning, Green Cover and Biodiversity, Energy and Green Buildings, Mobility and Air Quality, Water Management, and Waste Management. The indicators are progressive in nature to encourage cities to develop a roadmap for adopting appropriate actions for building climate resilience.

The Centre also aims to build national and global partnerships for strengthening advocacy, knowledge management, capacity building, innovation, and financing to address the increasing climate risks in Indian cities. C-Cube is the secretariat for the Climate Alliance. It has over 65 partners which include multi-lateral and bi-lateral organisations, CSOs, academic and training institutions, and philanthropic organisations. At a city level, C-Cube has developed a Climate Practitioners India Network (CPIN) wherein over 550 members are, at present, co-creating an operational plan to support 126 cities.

Early this year, C-Cube organised a climate change awareness campaign which reached more than 2.5 lakh people from over 110 cities. The campaign included Municipal Commissioners and key heads of urban local bodies (ULBs) and Smart City CEOs to create awareness across educational institutions including schools and colleges within their cities to align young minds to the challenges and solutions associated with Urban Climate Change and Sustainability. Moreover, developing the capacity of urban practitioners and public officials on ways to use the climate lens during project conceptualisation and planning will help cities in reducing future risks and enhancing urban resilience. To enable that, C-Cube has initiated various training programs to build conceptual, technical, administrative and innovation capacities across the ULBs. So far, 52 mentoring sessions on Urban Planning, Green Cover and Biodiversity; Energy and Green Buildings; Mobility and Air Quality; Water Management, and Waste Management have been conducted to train more than 1200 officials around the Climate Smart Cities Assessment Framework (CSCAF).

A 10-part learning series in association with WRI-India was conducted in 2021 which saw the participation of over 200 practitioners and young professionals. The learning series focused on Urban Resilience, Air Pollution, Nature-based Solutions, Green Buildings for Resilient Cities, Innovation in Climate Change, Urban Freshwater Ecosystems, Inclusive Climate Action Planning, EV Charging Infrastructure Deployment in Cities, Local Climate Action Plan, Prioritisation and Market Outlook, and Active Mobility Systems – Pandemic and Beyond.

As many as 25 dedicated technical training aligned to the CSCAF have been developed and delivered in association with Climate Alliance partners, wherein over 350 officials from across 40+ cities have been trained in the pilot phase. Presently, these training sessions are being scaled up through eight regional and academic institutions wherein 129 training sessions are expected to be delivered in the next few months.

The Climate Data Observatory (C-DoT) is another platform designed by C-Cube that aims to address the challenges in localising SDGs by empowering city officials, policymakers, climate champions, practitioners, and other stakeholders with climate-relevant data, visualisations, and resources they need to gather insights on the city level and national progress on climate actions. The C-DoT brings together dozens of datasets for the first time to let users analyse, synthesise, and compare national climate pledges under the COP26, discover how climate actions of cities can help achieve sustainable development goals (SDGs), understand vulnerabilities and readiness for climate impacts, and use models to map new pathways to a lower-carbon future. The objective is to showcase the progress of Indian cities in building climate resilience and help in developing a roadmap through data-informed decision making. This is enabled by - telling the story behind figures through observatory maps, demonstrating data as a reference tool for standards and guidelines, developing a toolbox of solutions, and fostering collaboration for innovation.

Acknowledgment: The author would like to thank Ms. Ayushi Govil, Jr. Research Associate C-Cube for providing support in the cover story.
Optimising Water Management by Building Capacities & Awareness

India, home to the world’s second-largest population, faces immense challenges when it comes to water distribution and management. However, institutions like the National Water Academy (NWA) have been making transformative efforts to address the issue. Highlighting this, Ashok Kumar Kharya, Chief Engineer, NWA, Pune, Central Water Commission interacted with Nisha Samant of Elets News Network (ENN).

The National Water Academy (NWA), Pune is envisaged to function as a ‘Center of Excellence’ in training water resources personnel. How are you faring on that front?

The National Water Academy (NWA), Pune is certainly faring well as a ‘Center of Excellence’ in training water resources personnel in India. The NWA was set up in 1988 under the Central Water Commission (CWC) which is an attached office with the Ministry of Jal Shakti. In its journey of over three decades, the NWA has systematically and consistently upgraded and expanded its activities towards its mission of training all stakeholders in the water resources sector.

Besides conducting cadre training programs for Central Water Engineering Services (CWES) officers, the Academy also conducts training programs for various stakeholders. These programs cater to stakeholders in core technical areas, emerging technologies, as well as in non-technical areas including water governance, participatory irrigation management, etc.

ASHOK KUMAR KHARYA
Chief Engineer, NWA, Pune, Central Water Commission

Since its inception till March 2022, NWA has conducted 832 programs benefiting 41,144 participants. Major beneficiaries of NWA programs are officers from the Centre and state governments, Central/State PSUs, as well as academia. The NWA’s training programs are open to all stakeholders. Since 2010, we have also been conducting awareness programs for school teachers; NGOs; Media; Farmers; Panchayati Raj Institutions (PRIs); Youth Representatives; etc. Further, customized training programs for professionals from other countries were also taken up as per demand.

NWA has been recognised as a Regional Training Center of the World Meteorological Organization (WMO) since 2012. The WMO’s executive panel of experts on Education and Training has recognized that ‘NWA is well organized with excellent programme and support facilities at international level’.

Building capacities of water resources personnel is of paramount importance, especially when we see new technology-driven solutions coming up. How has this impacted the water scenario in the country? What are some of the latest technologies
being leveraged in the sector to tackle water-related issues?

The NWA has always recognized the importance of leveraging technology-driven solutions to tackle water-related issues. The NWA conducted its first workshop on the Applications of RS & GIS in the water resources sector way back in the year 1996. Since then, the Academy has played a vital role in the capacity building of government organizations, PSUs, and even academic institutions. The training programs of NWA impart training and skills to the officials in the application of technology-driven solutions for water resources development and management. Being a national level academy, our role has always been in setting the trend through the introduction of new and emerging technologies through training programs. Later, these programs were adopted by State governments. We even provide assistance to State Government institutions as per the demand.

The application of Geoinformatics, various hydrological and hydraulic modelling tools, cloud-based platforms, programming languages, data analytics, etc. have huge potential. We need to leverage this to have a positive impact on the water scenario in the country. Capacity building and training are very crucial to creating a large scale impact in the changing scenario of water management. In this regard, the World Bank has appreciated the NWA’s work.

The disparity in water distribution is one of the root causes of India’s water conundrum. In your opinion, how can we address this?

The provision of water in requisite quantity, desirable quality, and in time to all the stakeholders has become a huge challenge. Growing sectoral demands, rapid urbanization, changing lifestyles, increasing industrialization, etc., are some of the bottlenecks that we face.

India has to support about 17 per cent of the world’s human and cattle population with only 4 per cent of the world’s freshwater resources. The country has high temporal and spatial variability, for the precipitation it receives. The irrigation sector is the major consumer of water in India. However, irrigation water use efficiency (WUE) is very low and its improvement is of paramount importance for sustainable water resources management.

Each river basin/sub-basin presents its own characteristics due to varying agro-climatic conditions, soil conditions, and per capita water resources endowment. Therefore, there is no unique solution for managing water resources. On the other hand, variability in precipitation and therefore water availability is further accentuating and becoming more unpredictable due to the impacts of climate change. While water conservation methods have local level necessities, the creation and management of large reservoirs are to meet large scale necessities.

As water is a necessity, for all economic activities, it becomes crucial to adopt smarter ways of water resources management. Managing water as an economic good is an important way to achieve efficient and equitable use and encourage conservation and protection of water resources. Capacity Building of all stakeholders is definitely one of the important tools to achieve the developmental objectives in a sustainable manner.

There are 14 Water & Land Management Institutes/ Irrigation Management Training Institutes and/or other similar bodies in all the major states which deliver multi-disciplinary programmes including agricultural aspects. Developing a network of institutions across the country forms a strong ground to synergize the efforts of various ministries/organizations dealing with Water Resources Development and Management.

As NWA provides training to not only government officials but also officials from PSUs, institutions, and more. Do you also have programs to sensitise people about conserving water and making them realise the limited availability of the precious resource?

Water is an integral part of the social and economic development of the nation. We need to spread awareness on water conservation among school students, teachers, media professionals, etc. and sensitize other stakeholders. It becomes imperative to fight water scarcity by striking a balance between usage and replenishment.

The NWA has been continuously expanding its boundaries regarding the number of training programs, areas of training, and various types of stakeholders or beneficiaries. Recognizing the need for spreading awareness on water-related issues, the NWA also conducts mass awareness programs for promoting water conservation and management. Periodic training for these groups is part of the NWA training calendar planned every year since 2003. Till date, 92 such programs have been conducted which were attended by 11,358 participants including 7374 school teachers and DIET faculty, 351 NGOs and media professions, and 3633 PRIs.
Catalysing Private Sector Engagement in Sustainable Development Goals

The private sector needs to be an active and engaging partner to effectively accomplish the Sustainable Development Goals (SDGs). The overall encompassing nature of the SDGs, spanning 17 goals and touching on the larger Post-2015 Development Agenda, provides ample opportunity to mobilise companies to advance common global priorities, writes Prarthana Borah, Director, CDP.

In recent years and particularly following Glasgow Climate Change Conference in 2021, the private sector’s contribution to reducing the impact of climate change as well as chalking the path for green transition gives a clear message that the business community is willing to engage in the accomplishment of the Sustainable Development Goals (SDGs).

As the private sector is emerging as a key player in effectively achieving the SDGs, now focus is on how this engagement can drive maximum impact. Another key area of discourse is to identify strong and meaningful private sector contributions instrumental to accelerating the SDG workstreams.

To catalyse private sector support for the SDGs, there is a need to understand that it can contribute to much more than Goals 7, 8, 9, 12 and 13 (refer to the table). Businesses can play a key role in every goal since consumption and production are overarching for the achievement of all SDGs.

The table illustrates the role of businesses in achieving the SDGs. Though not comprehensive, it is indicative of the major role the private sector can play in accelerating SDG action.

### How Businesses Can Help in Achieving the SDGs?

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<td></td>
<td>* Identify workers in their supply chains who are vulnerable to poverty and work towards their upliftment.</td>
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<td></td>
<td>* Ensure decent working conditions (fair wages, reasonable working hours, and adequate health and safety measures) for employees and workers across the supply chain.</td>
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<td>* Adopt sustainable procurement practices.</td>
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<td>* Design and deliver practical solutions for sustainable agriculture and food security.</td>
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<td>* Adopt business practices for establishing sustainable food systems that advance food security and protect the environment.</td>
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<td>GOAL 7</td>
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<td>GOAL 8</td>
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<td>GOAL 11</td>
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Along with the fact that we recognize that private sector engagement goes beyond just sustainable production and job creation it is important to understand that we need to see the private sector not just as a financier of SDGs but as a collaborator. There have been many conversations on the private sector charitable contributions for the SDG Means of the Implementation process. While private-sector financing can be helpful and drive the process of implementation, expected development returns from sustainable core business processes and practice is more beneficial than private sector giving. For a larger impact of scale and transformation especially in the context of low carbon transitions, we need to change core business practices to support sustainable development. Disclosure is the vehicle for greater business accountability and transparency. When corporations disclose the impacts of their business practices, they commit to a better and more sustainable business practice. It is in this context that disclosure can become an important tool for achieving SDGs if the SDGs as well as the Financing for Development process include a language that supports disclosure as a driver for the private sector to change its practices globally with an impact on local contexts.

One of the weakest areas of the Millennium Development Goals is partnerships. Strengthening partnerships both global and local is essential for the inspiring post-2015 development SDG agenda. However, this partnership aspect needs a stronger connection with the private sector, especially regarding the involvement of the sector in the implementation. Additionally, there is the need to broaden the accountability framework to include the business
community. While the accountability at present lies on state actors, the impact on implementation would accelerate with bottom-up accountability that puts the private sector in this space. An accountability framework that invites voluntary commitments from the private sector will further speed up the SDG implementation process.

Disclosure can help companies assess business processes and benchmark their strategies vis-a-vis sustainability leaders in the corporate world. The SDG process must develop a language that weaves in the process of disclosure to encourage companies, especially the bigger companies, to integrate sustainability information into their reporting cycle for the adoption of sustainability practices. To achieve Goal 12 disclosure could be an essential way of integrating SCP into business processes. Target 12.6 mentions that all Member States need to find a national benchmark for companies using in-country sustainability reporting. It also encourages countries creatively develop policies for a national strategy to support this target.

We have a clear image of climate risks and ecological degradation that lies ahead. We also know what we want the world to look like post-2015. This world we want cannot be created without the partnerships of government, civil society, and business. The world will be possible if collaborative. It is therefore required that we be innovative about the way we involve the private sector as real actors to achieve the SDGs. Companies need to be held accountable for their impacts and generate positive social, environmental, and economic returns for the communities in which they operate. Companies need to play a larger role in achieving SDGs and this role needs to be recognized and monitored for greater impact.

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Adopting and Implementing Integrated Policies and Plans Towards Adaptation to Climate Change

Urban India till a few years ago, was oblivious to facing the issues of climate change because most urban residents tend to believe that they live in a cocoon and no harm can befall them. For me personally, the first noticeable effects of the changing climate became evident, when there were fog banks covering the entire north of India, and Delhi plus a few large urban areas were relatively untouched by these fog banks, writes Vaishali Nandan, Project Head - Climate Smart Cities, GIZ.

Over a period of time, the effects of heat waves, urban floods, cyclones, droughts, etc. have been documented and some of these are also attributed to the effects of climate change. Many times, however, these issues can also be attributed to man-made or mis-management, for example, delayed opening of sluice gates of the Idukki dam coupled with landslides resulting from deforestation in the Western ghats (Kerala floods 2018).

Urban flooding is one example where rampant encroachments in the natural path of the flow of water lead to regular flooding and subsequent losses for both the municipality and city residents. Sometimes unplanned/ planned structures/ buildings come up in areas ignoring the area plans/ local knowledge. One such example is the Kochi airport, built on previously marshy land resulting in closure for a few days every year due to flooding. Chennai floods of 2017 can also be attributed to similar encroachments, with high rise buildings being built in previously marshy areas. Or filling of Construction & Demolition (C&D) waste in low lying areas or dumping of garbage in open drains, where even cities that are used to regular heavy rains, get flooded (Mumbai, Gorakhpur). Even, small actions by the city/ residents like paving of the inner-city roads and footpaths with tarmac and/or bricks and not leaving any recharge areas, result in a rapid flow of water along the natural slopes, thus contributing to urban flooding.

Some things attributed to climate change are the increase in intensity of rains in a shorter duration with or without varying frequency of rains, thereby contributing to the urban flooding phenomenon. Similar is the case with heat waves that are increasing in intensity causing loss of life and productivity.

Heat waves, especially in the northern plains, are getting more
frequent, with temperatures nearing 50 degrees Celsius in many parts of the northern plains. This year, temperatures in Delhi have already crossed the 100-year high in April. The increase can be linked to areas of dense buildings where air movement is restricted, large scale built-up (buildings, roads), decrease in the tree density, large scale usage of air conditioning, etc. A heat island mapping analysis conducted by GIZ for the cities of Kochi, Coimbatore and Bhubaneswar clearly showed the increasing temperatures in the cities in the past 10 years, which has mainly resulted from reducing blue-green infrastructure and an increase in built-up areas.

So, the question is, how can we provide adequate direction to prevent or correct these actions on the ground? One can contend that there is a need to re-look at current practices in cities. But where does one start?

A good place to start is the bye-laws governing the city administration. However, without the direction from the national level/ state level or proven evidence with application on the ground, changing the existing system is difficult.

Keeping this in mind, and as a part of the Climate Smart Cities project funded by the German Federal Ministry of Environment, Nature Conservation, Nuclear Safety, and Consumer Protection (BMUV) under the International Climate Initiative (IKI) and implemented jointly with the Ministry of Housing & Urban Affairs (MoHUA), Government of India and GIZ. GIZ is supporting the Smart Cities Mission at the national level and working in the 3 cities of Bhubaneswar, Coimbatore and Kochi on implementing concepts of integrated and climate-friendly urban development. The National Institute of Urban Affairs (NIUA), Deutsches Institut für Urbanistik (DIFU), and TU Berlin, are implementing partners to GIZ on the project.

The subject of climate change in the cities is being addressed via sectors, as this is what the cities understand and are comfortable implementing. Thus, the areas of implementation on the ground included subjects like management of stormwater, construction and demolition (C&D) waste management, solid waste management, urban green planning, and green buildings, depending on the choice of the city.

All cities have introduced some changes in their policy framework, for example, Coimbatore has launched an ‘Adoption policy for open space reserved (OSR) areas’ to convert OSRs into mini forests using the Miyawaki method and through community and public-private initiatives (34 MoUs have been signed and 100 planned); C&D waste dumpsites were identified based on an environmental checklist and dumping in low-lying areas was prevented (17 sites); a local Climate Alliance has also been formed. Similarly, in Bhubaneswar, C&D waste management bye-laws are under the notification, while in Kochi a checklist for green buildings was launched by the Mayor. The sponge city concept is under development for the Nayapalli area in Bhubaneswar, with rainwater harvesting, perforated pavements, etc. being proposed as measures for urban flood prevention.

However, the interconnectedness of all these sectors is far from being realised and they continue to function in silos. The fact that all areas are elements of the larger integrated urban planning puzzle is far from being realised by the city.
governments. Attempts were made by the project to integrate some aspects in the master planning process in the cities, however, they did not progress far.

At the national level, steps towards an integrated approach have been initiated in the form of the Climate Smart Cities Assessment Framework (CSCAF) exercise initiated by the Smart Cities Mission of the Government of India, with the support of GIZ and NIUA. CSCAF clubs 12+ subjects (waste supply, wastewater, stormwater, energy, green buildings, waste management, mobility, air quality, urban planning, biodiversity and green cover) into 5 sectors and 28 progressive indicators for ease of work. The CSCAF has also been integrated in the National Mission on Sustainable Habitat, however, these can be considered only baby steps towards integrated urban development for the silos to be broken.

Steps towards an integrated approach have been initiated in the form of the Climate Smart Cities Assessment Framework (CSCAF) by the Centre’s Smart Cities Mission with the support of GIZ and NIUA.

Training and capacity building are other forms of implementation support. It is hoped that policy changes strengthened by learnings from the ground-level implementation will provide the Training institutes with the necessary tools and champions for further scale-up. State or regional training institutes must be empowered to train as well as deliver in local languages for sustainability.

We should address these gaps in planning and implementation should be addressed through several means, namely-

i) Stronger ownership from the urban planning fraternity to climate proof the Master Plans, area development plans, etc., and move towards an integrated urban planning approach.

ii) City managers need to be trained to look at the city as a whole and not in parts.

iii) Need for community participation to act locally.

It is hoped that by doing some of the above, we will move one step closer to adapting to the vagaries of climate change. 

Figure 2: Urban Heat Island mapping analysis and Open Space Reservation area being converted into a Miyawaki plantation, Coimbatore
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Digital Technology & the Sustainable Development Goals

Post 2000 and the dotcom bubble burst, technology has drastically changed our daily lives and society, with the advent of smart phones and usage of social media. Technology has changed not only media, climate action and healthcare but many sectors over the past years. It is a revolution that has not only changed our daily habits but can be used to improve our daily lives and in the future be more sustainable, writes Dr Gayatri Doctor, Associate Professor & Program Chair, Master’s in Urban Management Program, Faculty of Management, CEPT University, Ahmedabad.

The “2030 Agenda for Sustainable Development” has been adopted in 2015 by all the United Nations Member States. It provides a shared blueprint for peace and prosperity for people and the planet, now and in the future. The Sustainable Development Goals (SDGs) aim to bring together all countries developed and developing, across the globe to tackle some of the world’s most important and critical issues. Along with strategies to improve health and education, there must be a focus on ending poverty, reducing inequality, improving economic growth. Dealing with and tackling climate change and preserving oceans and forests must also be a part of the agenda. The aim is to create a more sustainable future by 2030. The United Nations has identified “Science, Technology, and Innovation” as one of the main “means of implementation” to be able to achieve the SDGs by 2030 (United Nations, 2022).

Post-2000 and the dotcom bubble burst, technology has drastically changed our daily lives and society, with the advent of smartphones and social media. Technology has changed not only media, climate action, and healthcare but many sectors over the past years. It is a revolution that has changed our daily habits and can be used to improve our daily lives and in the future be more sustainable.

Many people around the world are already using the internet. Yet much more can be done in this epoch of connectivity, sharing, storage, and increased processing power. Technology can help reduce inequalities by providing access to services like e-health, e-learning, and more. Using e-tools, the government can connect with the citizens better, improve information management, and stakeholder engagement.

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engagement. One of the important enablers to enhance digital connectivity and minimize digital isolation is Broadband. Billions of people have access to information and various types of online tools owing to the advent of mobile technology. This allows for insights into populations and their patterns of usage.

The Fourth Industrial Revolution, more commonly known as Industry 4.0, is all about the Internet of Things (IoT). A popular definition of IoT is “the network of physical objects that contain embedded technology to sense and interact with the environment and each other to collect and exchange data to make our lives better”. Data analytics, sensors, and IoT are instrumental in solving some world problems by networking and communicating, as this allows the sharing of valuable information across networks, devices and machines; tracking and monitoring by enabling real-time data capture and reporting about the operational performance of connected systems; analysing, optimising, predicting and deriving insights from the collected data for informed decision making; automating by connecting the digital and physical worlds through the creation of autonomous systems and remote control (Jacobsen, 2018).

New business models which leverage technology are being introduced by governments and businesses, this promotes sustainability and improves the general standard of living. Artificial Intelligence (AI), blockchain technology, machine learning, robotics, 5G, cloud computing, are several other emerging technologies that are being utilised in solutions in an attempt to achieve the SDGs. These technologies are connecting citizens around the world, monitoring, and tracking environmental impact, optimising industrial inefficiencies. They contribute to vast improvements in access to public services, provision of social protection, and new economic opportunities for many people. Thus, traditionally wasteful practices are being transformed into sustainable and efficient means of operation. (Doyle, 2021).

At one level, digital technology is formally included within multiple SDG targets, especially under Goal 9 for infrastructure and innovation. Target SDG 9.1 is to “Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.” Target 9.c is to “Significantly increase access to information and communications technology and strive to provide universal and affordable access to the internet in the least developed countries by 2020.”

As per International Telecommunication Union (ITU), digital technologies can contribute significantly to the fulfilment of every SDG. These solutions can help farmers reduce their use of energy but increase crop yields, thus contributing to SDG 2 on Zero Hunger. SDG 3, focusing on good health and well-being, can be addressed by directly interacting with patients, health informatics and telemedicine. These services can be improved through better connectivity. New and emerging digital technologies facilitate smart water and sanitation management, and wastewater management catering to SDG 6 on clean water and sanitation. SDG 11 deals with sustainable cities and communities and aims for cities to take key steps to become smart and sustainable. Smart cities are where digital connectivity, data, and citizen knowledge generates opportunities for public services to become better adapted for the citizens. Digital tools allow increasingly sophisticated climate modelling. Green data centres and green power feeding systems are promoted by establishing standards thus SDG 13 addressing climate change action is promoted. Technology can be used to identify, monitor, photograph, and track wildlife populations. Radio Frequency Identification (RFID) chips and sensor networks can be used to protect endangered animals to learn more about their migratory patterns and their needs for protection. This helps achieve SDG 15 which brings to focus life on land (International Telecommunication Union, 2021).

Digital Public Technologies (DPT) need to be understood in the context of complex digital ecosystems that governments and service providers need to navigate. (Ingram, McArthur, & Vora, 2022). Figure 1 illustrates the foundational role of physical and platform infrastructure in enabling applications and services to thrive across the public and private sectors. These infrastructure layers
underpin every retail e-commerce solution, mobile and online banking interface, health and fitness application, e-government service, and much more.

Together they enable a sort of explosion of innovation, in the form of applications that simply cannot be predicted or even limited. When present, pervasive, and designed well, physical and platform infrastructure has the potential for widespread use that serves all social and economic sectors, including those that promote SDG achievement.

As shown in the figure, there are five different DPT platforms which can play an important role in accelerating SDG achievement.

- Personal identification and registration infrastructure allow citizens and organisations to have equal access to basic rights and services.
- Payment’s infrastructure enables efficient resource transfer with low transaction costs.
- Knowledge infrastructure links educational resources and data sets in an open or permissioned format.
- Data exchange infrastructure enables interoperability of independent databases.
- Mapping infrastructure intersects with data exchange platforms to empower geospatially enabled diagnostics and service delivery opportunities.

All the above-mentioned platform types can contribute directly or indirectly to an array of SDG outcomes. For example, the ability of a person to register their identity is important. SDG 16.9 focuses on legal identity for all including birth registrations; SDG 1.4 is all about equal rights to ownership – control over land and other forms of property; SDG 8.10 is all about access to banking, insurance, and financial services to all.

While DPT platforms offer the potential to help advance many SDG strategies, design and deployment processes often raise considerable challenges. Financial stability is one of the most common operational problems. Limited capabilities to design, deploy and manage a platform, and procurement obstacles within the government are other problems. DPTs can also diminish SDG outcomes, lead to misuse of individuals’ data, and increase the inequalities in digital access.

There are three possible ways to harness technology, achieve the SDGs, and create a better world. First, replacement, which is using technologies to replace a manual process, digital signatures against traditional paper signatures or digital payments against paper money. Second, optimisation, which relies on technology to make a process more efficient by way of data or automation, increasing productivity, and reliability. The third is to redesign, which is creating new business models using technologies to reinvent a product or a service. Multi-user vehicles like Uber, Ola, provide a unique opportunity to reduce resources and contribute to sustainability instead of single user cars or Swiggy and Zomato for food delivery (IE University, 2021)

Digital technologies take on an important role in the attainment of the SDGs by 2030, especially with the deployment of new technologies and innovations. New technologies bring with them unknown opportunities and risks, innovation can affect progress both positively and negatively.

References
Emerging Challenges & Initiatives in Water Management
A case of Ahmedabad

Globally, realising water as a basic need of human life, the settlements were established along the river banks and Ahmedabad is one such city. The growing water problems—floods and/or water scarcity have an adverse impact on life, growth, prosperity, and national security. According to the Composite Water Management Index (CWMI) report released by the NITI Aayog, 21 major cities in India will run out of groundwater by 2020, affecting access to water for 100 million people (NITI Aayog, 2019). This calls for urgent and improved management of water resources. Also, among the 17 sustainable development goals (SDGs) laid out by the United Nations, to which India is committed, many have a direct and indirect linkage with water. SDG 6 specifically focuses on ensuring the availability and sustainable management of water and sanitation.

Ahmedabad’s water scenario
Ahmedabad, located along the Sabarmati river, has an area of 505 sq km consisting of seven zones and 48 wards. The city population has grown from 55.77 lakh (census, 2011) to 70.33 lakh in 2021 (provisional estimates). The city is a major economic and industrial hub of the country. It has several infrastructural landmarks around the water which make the city distinct. The modern projects include the Sabarmati Riverfront, Kankaria Lake, and historical water management structures like Adalaj ni vav, etc. The city in the past had followed traditional water management practices like tanka system which can still be seen in the old city.

Natural water systems of Ahmedabad
Ahmedabad receives an average rainfall of 782 mm, mainly during the monsoon months of June to September. In earlier days, the natural water system of Ahmedabad constituted of number of lakes and numerous streams connecting them to river Sabarmati. Over the years, most of the natural drains were lost to urban growth. The lakes have reduced from 204 in 1960 to 105 in 2021.

Water demand and supply
The current water demand for Ahmedabad is estimated to be approximately 1090 MLD. This demand excludes major industrial, commercial and institutional demand. The water demand for the city is met from multiple sources which include Narmada main canal, Mahi River, and groundwater. This water is treated at water treatment plants and supplied to the city (Table 1). The domestic water supply system for the city is represented in Figures 1 and 2.

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Groundwater use trends

The city was mainly dependent on groundwater sources till 1970-80 (Figure 3). As a result, between 1975 and 2000, the groundwater table dropped 3 to 4 metres a year. Various augmentations from surface water sources were done over the years. This resulted in a shift from dependence on groundwater to surface water sources. The approach currently is inclined towards bringing water from another source, which may be far distant through pipelines, the cost of which is of course enormous. For example, most of the city water demands met through piped supply is met from Narmada or Mahi river.

<table>
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<th>Capacity (MLD)</th>
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<td>1</td>
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<td>810</td>
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<tr>
<td>2</td>
<td>Jaspur (Dholka branch canal of Narmada)</td>
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<td>Raska (river Mahi water)</td>
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<td>200</td>
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<tr>
<td>4</td>
<td>Borewells</td>
<td>100</td>
<td>130</td>
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<tr>
<td>5</td>
<td>French wells</td>
<td>170</td>
<td>0 (currently not used)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1900</strong></td>
<td><strong>1485</strong></td>
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Source: https://ahmedabadcity.gov.in/

Treatment of used water

Sewage and industrial effluents are the two major sources of urban used water. The AMC has 16 operational STPs as of 2020 to treat 993 MLD of sewage and two more are under trial. The treated sewage from STPs now has to meet stricter standards prescribed by the National Green Tribunal (NGT) in 2019.

For the industrial effluents, there are seven common effluent treatment plants (CETPs) to treat effluents generated by micro, small and medium enterprises (MSMEs). The large industries are supposed to treat their own effluents.

The treated sewage and the industrial effluents are discharged into the Sabarmati, downstream of Ahmedabad. The infrastructure created has not been able to meet the prescribed norms and, therefore, pollutes the river (Bansal, 2017). The focus is currently on end-of-pipe treatment (EOP) for sewage and industrial effluents. This may not be the best practice keeping sustainability of water in mind.

Water supply coverage in slums is 75 per cent due to the liberal policy of Ahmedabad Municipal Corporation (AMC) for granting and providing water connections irrespective of tenure status. The city has an intermittent water supply and does not have 24x7 water supply as desired by service level benchmarks (SLB) set by the Union Ministry of Housing and Urban Affairs (MoHUA). The maximum supply of water by the corporation is for two-three hours a day.
Sabarmati river pollution

Sabarmati river receives the used domestic as well as industrial water, with or without treatment. In addition, there are some stormwater drains opening into the river which also carry pollution due to illegal connections by residential societies and industries located in the city. Some of the so-called treated sewage and treated industrial effluents are also discharged into Kharicut, which finally meets the Sabarmati before meeting the Gulf of Cambay.

The release of these discharges has resulted in extensive pollution of the river. The river quality, upstream and downstream of the city is shown in Figures 4 and 5.

The river, downstream of Ahmedabad is not able to meet the bathing water quality standards. The dissolved oxygen (DO) is zero in most stretches and the river can be termed as ‘dead’. There is no question of any riverine ecosystem with such low DO. The values of biological Oxygen Demand (BOD) are many-fold higher than the acceptable levels. Besides, the river has heavy metal pollution (Bansal and Parthasarathy, 2020; TOI, 2021).

The extensive pollution in the river has even polluted groundwater in downstream villages. The impacts of this are enormous. It has resulted in health issues, impacted livestock and agriculture as heavy metals seep in the vegetables grown using the polluted water which are then consumed by the city residents (Bansal and Parthasarathy, 2020).

The high pollution in the Sabarmati has been taken suo-motu by the Gujarat High Court. The court has taken the AMC, pollution control board, and the polluting industries to task for polluting the river and has issued many directions to check the river pollution and restore the river quality. Prior to this, there have been multiple cases where either the National Green Tribunal (NGT) or the Gujarat High Court had taken cognisance of pollution in the Sabarmati and had issued multiple directions but so far, we have not seen any improvement inspite of the infrastructure created.

Water Management Issues

In the context of ongoing discussion on sustainable and resilient water management in Ahmedabad, the following issues are identified.

The non-revenue water (NRW) in Ahmedabad is more than 30 per cent which is higher than the SLB of <20 per cent. There are some initiatives to lower these losses by using the SCADA system, however, a long way still needs to be covered.

The unmetered water connections is another crucial issue in the city. Since the connections are not metered, water tariffs are not based on the quantity of water consumed. It is covered as a part of the property tax, which is levied based on the plot area or built-up area. This is not good practice to keep a check on the optimum use of water and prevent its wasteful use.

As far as cost recovery of the water projects is concerned, there is hardly any thinking on this. Water supply is an obligatory function of the local body and is highly subsidised and is not at all reflective of the cost of the project. The taxes may not even be meeting the operation and management costs of the water supply system.

There is minimal reuse of water in the city; hardly 2 per cent of water gets reused. Water being a scarce resource, there should be an attempt to reuse every possible drop of it. The city government is trying to promote the dual plumbing system in residential societies. Even at the city level, there are some attempts to reuse water. For example, there is 0.5 MLD STP set up...
in Vastrapur lake which would be used for watering the green areas. There is an ongoing discourse on using treated sewage for industrial purpose, however, much still needs to be done to make it practically possible.

Storm Water Management is another challenge faced by the city. The number of pluvial flood incidences in the city have increased. The city’s capacity to absorb runoff is rapidly decreasing due to the high density of built-up, low green cover, choking of natural drainage by waste dumping, etc.

Pollution of water resources is another big challenge. In the city, the treated/untreated water gets discharged into the Sabarmati. This has resulted in high levels of pollution in the river which has now become a chronic issue.

**Initiatives for water management**

The stormwater, on how it gets managed becomes either a resource or a problem. Recognising the shortage of availability of water to meet that current and future needs of the city, the approach should be to conserve every possible drop of water. The initiatives of the city to manage water are discussed in this section.

Lake interlinking project was undertaken by AUDA in 2005 in the western part of the city to keep the city free from floods, utilise storage capacities of lakes, and create recreation spaces. Vastrapur lake is one such rejuvenated lake which is being used by the city for recreation. However, the lake interlinking project has been of limited success.

Another initiative is the independent lake redevelopment project undertaken by AMC. A recent project is Lamba lake redevelopment, where a dead water body has been revived.

The Riverfront development is another project. The project though intended to rejuvenate the river, keep it pollution-free, is also an attempt to attract the investment of real estate players in the vast land reclaimed as part of the project.

Under Smart City, the city water supply is being monitored through the SCADA system. The main functions of the SCADA system include real-time monitoring of all hydraulic and analytical parameters of WDS, WTPs and French wells; monitoring of pumps for discharges and electricity consumption; monitoring of treated water quality; and saving expenses in electrical and chemical inputs.

**Conclusion**

The natural water system of Ahmedabad—lakes, streams and the Sabarmati river, all have been modified significantly over time. This is because of rapid urban expansion, inadequate understanding of water systems, and not integrating blue infrastructure into development. The number of lakes which have disappeared from the city landscape is high. Some respite is there due to recent initiatives such as interlinking of lakes, lake rejuvenation, and reduced use of groundwater. The city’s water supply has been augmented from surface water resources, reducing its dependence on groundwater significantly. However, this has created a challenge of dependence on surface water brought from far away from resources, an approach which is not sustainable.

The city is currently facing the issues of water governance and meeting the expenses in operations and maintenance of the water supply systems, the high non-revenue water, unmetered connection, minimal reuse of treated used water etc. The disposal of treated and treated water into the river from both domestic and non-domestic users has made the river devoid of oxygen downstream of Ahmedabad.

For sustainable management of stormwater, every drop of water that falls needs to be conserved. This is far away from being realised in the city. There is hardly any initiative for integrated water resource management.

The SDGs linked to water are not being realised in the city so far. With the current initiatives and the challenges, the city’s water system is yet far away from being sustainable and resilient. The current initiatives are a move in the positive direction, but much needs to be done to make the city’s water system sustainable and resilient.

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Ocean Plastic – Turning the Tide to Tend the Turtles

From a society's perspective, plastic pollution is a symptom of a broader challenge to sustainable production and consumption. Therefore, it is relevant to approach the challenge through the rubric of Sustainable Development Goals (SDGs). In this article, Dr Gaurav Bhatiani, Director (Energy and Environment) and Nutan Zarapkar, Director (Water, Sanitation and Hygiene) share that to fight plastic pollution, accelerating the adoption and deployment of technologies will require a change in the mindset and new approaches to developing collaborations.

A study by University of Queensland scientists reports that more than half of the turtles globally have ingested plastic. The number varies by different species and oceans, but plastic pollution and its ingestion is a common concern globally. While the direct threat to human health is still to be conclusively proven, there is enough evidence that plastic pollution is a clear and present danger and needs to be addressed by concerted and coordinated action on multiple fronts. From a society's perspective, plastic pollution is a symptom of a broader challenge to sustainable production and consumption. Therefore, it is relevant to approach the challenge through the rubric of Sustainable Development Goals (SDGs).

India ranked low (120) on the recent Sustainable Development Index rankings published by Cambridge University. The report lists several SDGs such as Sustainable Communities and Cities, Life on Land, Life below Water, and, Good Health and Well-Being, as "major challenges" for the country. Sustainable waste management is an underlying challenge common to several SDGs, as evident from the existence of the world's largest open dumpsites in cities such as Delhi and Mumbai. Large populations often live close to them, and a large informal sector exists working in them.

We are being choked to death by the amount of plastic that we throw away. It’s killing our oceans. It’s entering into our bodies in the fish we eat.”

~ Kein Bacon

DR GAURAV BHATIANI
Director (Energy and Environment)

NUTAN ZARAPKAR
Director (Water, Sanitation and Hygiene)
Efforts to improve waste management started in 2014 (World Bank What a Waste 2.0) with the launch of the Swachh Bharat Mission. While the initial focus was to reduce and eliminate open defecation, the importance of scientifically managing various waste streams is now well recognised. Regulations were strengthened in 2016 and incentives were provided through central schemes. Nevertheless, the change has been slow and there is growing recognition that the increasing quantum of waste requires urgent and decisive action, particularly to manage more challenging components such as the non-recyclable and single-use plastic, and electronic waste, among others.

Managing plastic waste, particularly the non-recyclable component, is a key concern because of its wide-scale use and properties. Plastic is used from money to packaging to appliances to sanitary napkins, etc. It is present in almost everything that we use. Its consumption and production have increased rapidly. In 1950, the world produced 2 million tons a year, which increased 200-fold by 2015. Globally, to date, there is about 8.3 billion tons of plastic in the world – some 6.3 billion tons of that is trash. The discarded and untreated plastic waste spills onto land, flows into water bodies, and ultimately to the seas and oceans. It severely pollutes the environment posing a serious threat to the ecosystem and its health.

India generates 15 million tonnes of plastic waste every year but only one-fourth of this is recycled due to an inadequate solid waste management system.

Realising the gravity of the challenge, the Plastic Waste Management Rules of 2016 and 2018 were recently amended in February 2022 to focus on the stringent implementation of the Extended Producer Responsibility. The Plastic Waste Management Rules, 2016, mandate the generators of plastic waste to take steps to minimise generation of plastic waste, not litter the plastic waste, and ensure segregated storage of waste at the source. The rules also mandate the responsibilities of local bodies, gram panchayats, waste generators, retailers, strengthened the and street vendors to manage plastic waste. The recent amendment has further strengthened the Extended Producer Responsibility Guidelines covering (i) Reuse; (ii) Recycling; (iii) Use of recycled plastic content; (iv) End of life disposal. The key changed enabled in the amendment include:

- Extended Producer Responsibility Certificates: The guidelines allow for the sale and purchase of surplus extended producer responsibility certificates. This will set up brand owners a market mechanism for plastic waste management.

- Centralised online portal: The government has also called for establishing a centralized online portal by Central Pollution Control Board (CPCB) for the registration as well as filing of annual returns by producers, importers and brand-owners, plastic waste processors of plastic packaging waste by 31st March, 2022.

While the policy action is commendable, a comprehensive ecosystem encompassing technology, financing, and stakeholder engagement is required to address interrelated challenges of reducing the use of plastic by developing alternatives, scientific management of waste on land to reduce the amount going to dumpsites, and extract waste already in water bodies such as rivers and oceans.

On the technology front, research and development have created several newer alternatives to complement traditional options i.e., glass, steel, wood, and plant materials such as leaves. These options include recyclable plastics (polylactic acid PLA as an example) that are compostable and made from natural sources such as corn or sugarcane pulp, amongst others. Bioplastic made from lignin, a byproduct from paper mills is another promising material with multiple use cases such as replacement for plastic, polyethylene and nylon.

Collecting floating ocean plastic waste is more burdensome and complicated than collecting it on land. However, efforts are underway by technology players to test and commercialise solutions for the management of ocean plastic waste. One such technology is Sea Robots. This aqua drone "sweeps up" plastic waste from the ocean surface with the help of computer vision and remote sensing. Another upcoming application is a system for large-scale collection of plastic waste in the form of fishing nets and ropes. This system has been collecting 7,000 metric tons of raw material for plastic recycling every year and using it to develop a strong nylon yarn that can be used in clothing, carpets and other textiles. This
approach reduces ocean waste as well as pollution from textile manufacturing. Still, others are working to develop processes that convert plastic waste into a high-quality liquid, which can then be used to produce new plastic products and chemicals.

While these new technologies hold promise, it is more effective and efficient to manage the plastic on the land before it enters the water bodies. While several Waste to Energy (WtE) plants have been developed, their cost is high and performance less than satisfactory. Unfortunately, the focus on developing WtE has meant that incineration of non-recyclable plastic in cement kilns remains underutilized. India is the second-largest producer of cement globally with manufacturing facilities spread in many states. Further, incineration in cement kilns recycles not only extract the embodied energy but also the material, leaving no residue, unlike the WtE facilities. Since cement plants require relatively minor investment to treat the waste and are already equipped with emission monitoring systems, this low-cost option needs to be incentivized through policy and regulatory mechanisms. Such an approach need not be exclusionary; i.e., similar incentives can be provided to WtE and cement kilns to enable the best possible option depending on location and local circumstances. It is likely that large metros and cities that are at longer distances from cement plants will require WtE plants, but many towns and cities may have a better alternative readily available in form of a cement kiln close by.

Accelerating the adoption and deployment of technologies will require a change in the mindset and new approaches to developing collaborations. According to UN Environment Programme Executive Director Achim Steiner, "Marine debris – trash in our oceans – is a symptom of our throw-away society and our approach to how we use our natural resources."

First, partnering with citizens and local communities to ensure that waste is minimised by using alternatives. Second, to segregate waste at the source and transport it as such. Third, involving the informal sector as a partner, developing business models and collaborative local solutions will further enable this transition. Fourth, there is a need to address governance challenges in the sector. Often, last-mile officials are engaged in unethical practices that undermine the viability of investments and threaten the environment and health of citizens. Last but not the least, develop institutional capacity, particularly of the urban local bodies involved in managing the plastic waste.

Many of these challenges and solutions are known. Expert committee reports and international experience provide an extensive body of knowledge to guide the transformation. Funding is abundantly available and so are better technologies. What we need is a realization. A realisation best quoted in the words of the Dalai Lama, “We have a responsibility to look after our planet. It is our only home".

The Plastic Waste Management Rules, 2016, mandate the generators of plastic waste to take steps to minimise generation of plastic waste, not litter the plastic waste, and ensure segregated storage of waste at the source.

Towards Sustainable Growth in a World of Irreversible Urbanisation

Ever since the economic liberalisation across the globe in the mid 19th century, the trends of industrialisation and urbanisation have been on the surge. The year 2007 marked a major landmark as the global trajectory of the urban population surpassed the rural population proving the world’s inclination toward urbanisation, write Nisha Priya Mani, Project Manager-Cities and Alpana Jain, Programme Lead – Cities at Nature Conservancy India Solutions Private Ltd.

India, being a developing country, exhibited a similar trend with respect to the urban population, which increased about 14-fold between 1901 to 2011. The country is projected to switch over to a population with an urban majority by 2070. The urban areas contribute to about 2/3rd of the country’s GDP.

The messages from across the globe, including from India are loud and clear.

- Urbanisation is rapid, irreversible, and undeniable.
- Urbanisation is important for faster economic growth thereby reducing poverty.

While reaping the benefits of economic urbanisation, people should also acknowledge the fact that just like the process of urbanisation, the loss of ecological integrity that may result due to anthropogenic pressures is also irreversible. The huge population decline of the Ganges river dolphin is a striking example of how we are losing the species due to habitat disturbance caused by habitat fragmentation, pollution, and indiscriminate fishing activities. A prediction model by McDonald et al. (2014) shows that urban growth in 10 per cent of all ecoregions across the globe would impact about 80 per cent of vertebrate species between 2000 and 2030. And thus, it is essential to take corrective measures at the earliest to prevent

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Thanks to the Stockholm Convention, 1972 under the United Nations for serving as a harbinger of a more focussed approach to environmental conservation and climate action. With incremental impacts of multinational pacts such as the Kyoto Protocol, the Copenhagen Accord, and the Paris Agreement on Climate Change, it is heartening to note the penetration of climate emergency down to sub-national levels for climate actions. The United Nations’ adoption of Sustainable Development Goals (SDGs) and unprecedented commitment from nations to the Paris Climate Change Agreement is a real win for the global community in tackling the threat of indiscriminate urbanisation and climate change to people and nature.

India’s National Mission on Sustainable Habitat (NMSH) under the National Action Plan on Climate Change (NAPCC) and Nationally Determined Contributions (NDCs) towards achieving an economy-wide reduction of carbon emissions by 45 per cent by 2030 from the 2005 levels and attaining carbon neutrality by 2070, are some of the ambitious goals of the country, urging people from both top-down and bottom-up towards taking necessary measures for the development of inclusive and climate-resilient cities. With cities known to contribute a major share of greenhouse gases, the country’s initiative with Smart City Mission encourages cities to take up planning and implementation of environment-friendly measures for the sustainable development of cities. The Climate Smart Cities Assessment Framework 2.0 (CSCAF 2.0) developed by the National Institute of Urban Affairs (NIUA) under the NMSH aims to guide cities’ development in a holistic, inclusive, and climate-responsive manner by measuring its development performance against a set of environmental indicators broadly including:

i. Urban Planning, Green Cover, and Biodiversity
ii. Energy and Green Buildings
iii. Mobility and Air Quality
iv. Water Management
v. Waste Management

Under the aegis of the Smart City Mission in various cities across India, several initiatives are being taken for environment-friendly urbanisation efforts. One of the several notable works by smart cities in collaboration with the sub-national governments is the restoration of 200 water bodies in Chennai, a coastal city in the state of Tamil Nadu that is vulnerable to both floods and droughts. With the complementing efforts by the state government such as mandatory rooftop harvesting initiated in 2004, and augmentation of groundwater levels by artificial recharge structures and zonation of aquifer areas in the city’s development plans have minimized stormwater run-off from a flood-prone city and also replenish

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the groundwater sources.

Working on similar lines, we at The Nature Conservancy-India are working on demonstrating a scientific approach to restoring a degraded wetland in Chennai which can be replicated for other ecologically disturbed water bodies. The project on the eco-restoration of Sembakkam lake involved a thorough baseline study to understand the characteristics of the watershed, hydrogeological formations, water quality, biodiversity, and community perceptions to come up with a holistic restoration plan. The study revealed that with the alteration of natural hydrology and increase in groundwater demand due to urbanisation in the region, three to four months of dry months will lead to drying up of the entire lake, eventually rendering a change in land use. With the help of subject matter experts, we came up with a novel solution to treat the incoming wastewater using eco-system based adaptive solutions (constructed wetland system using Phragmites australis and Canna indica) such that the wastewater when treated and let into the lake, would replenish and allow the lake ecosystem to thrive and provide ecosystem services. When urbanisation brings the threat of wiping out natural resources, such holistic and integrated efforts offer promising solutions to build climate-resilient cities. Learnings from such projects can then be scaled up across other vulnerable landscapes and ecosystems.

In an attempt to create impact at a larger regional scale, we are working with the Planning Department of Chennai to develop a green print for the city which is a sustainable urban plan or a conservation plan for the city. This effort envisions integrating the natural infrastructure such as the wetlands, urban forests, and green and pervious surfaces into the new masterplan or the spatial plan of the city which is currently under development. This will go a long way in building water security, preventing floods, increasing carbon sequestration, improving air quality, lowering surface and ambient temperatures, conserving habitats for biodiversity, along with positively impacting the health of the citizens. This is again a pilot in Chennai that has the potential to be scaled up to all cities across the country.

Besides efforts from the government, public-private partnerships (PPP) and corporates supporting sustainable approaches through their Corporate Social Responsibility (CSR) efforts and commitment to the reduction of greenhouse gas emissions are some of the welcome changes helping in the sustainable development of the cities. However, gaps do exist in knowledge and practical implementation of urban development strategies as these are emerging concepts which need time testing to provide clear results. Nevertheless, with more and more actors taking up the cause of building climate-resilient cities, and with more and more sustainable development practices and strategies coming together, we are definitely on a path to creating healthy and liveable cities effectively adapting to climate change. With adept strategies and the implementation of sustainable development practices, the ill effects of urbanisation can be minimized, though evidently irreversible in most ecosystems.
IGNITING MINDS IMPACTING LIVES

By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.
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