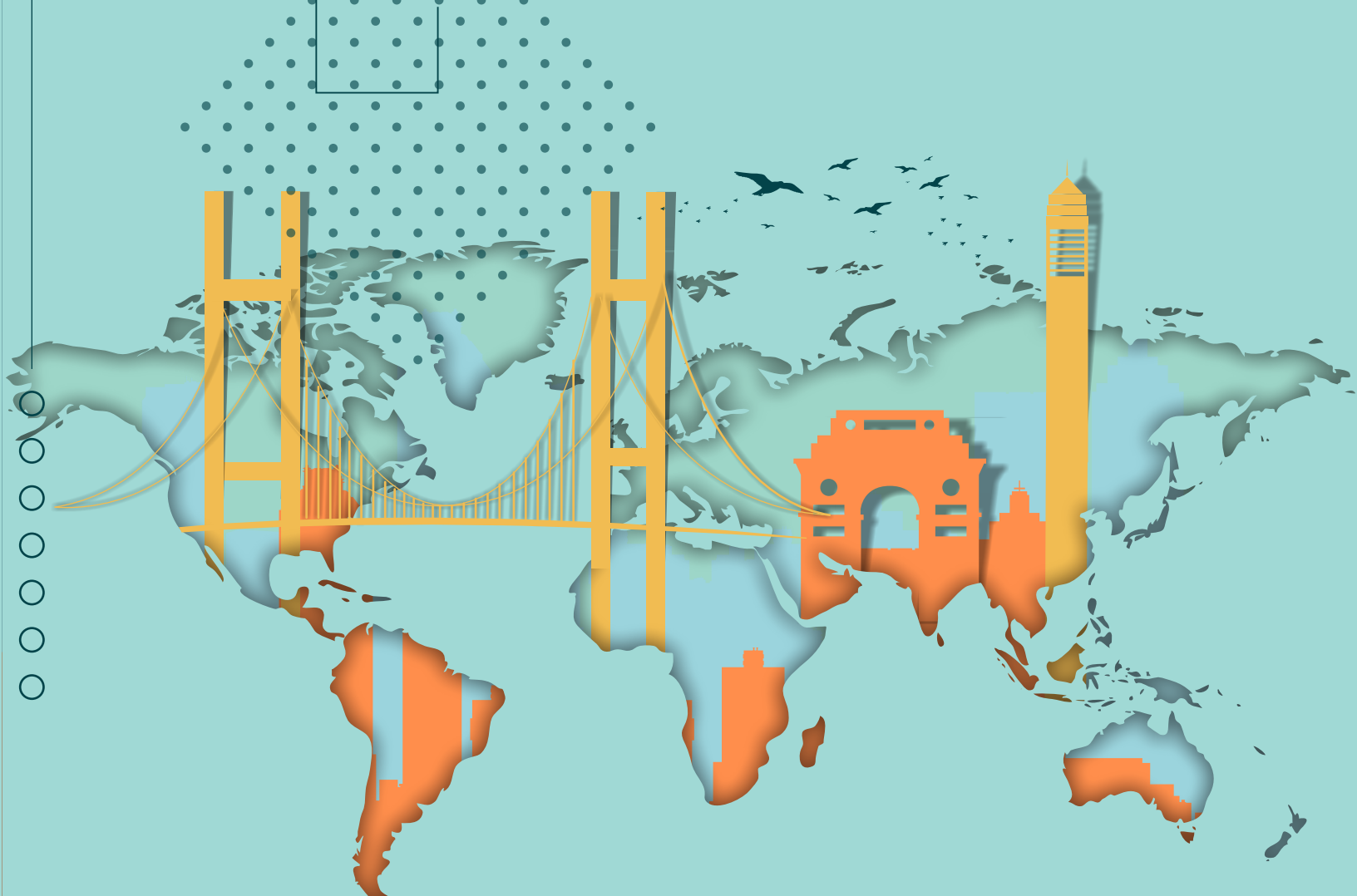


The Urban World

Quarterly Publication



Regional Centre for Urban & Environmental Studies
All India Institute of Local Self-Government, Mumbai



Regional Centre for Urban & Environmental Studies (RCUES), Mumbai (Fully supported by Ministry of Housing and Urban Affairs, Government of India)

Established in 1926, the All India Institute of Local Self Government (AIILSG), India is a premier autonomous research and training institution in India. The Institute was recognized as an Educational Institution by Government of Maharashtra in the year 1971. The Institute offers several regular training courses in urban development management and municipal administration, which are recognized by the Government of India and several State Governments in India.

In the year 1968, the Ministry of Housing and Urban Affairs (MoHUA), earlier Ministry of Urban Development), Government of India (GoI) established the Regional Centre for Urban & Environmental Studies (RCUES) at AIILSG, Mumbai to undertake urban policy research, technical advisory services, and building work capabilities of municipal officials and elected members from the States of Goa, Gujarat, Maharashtra, Rajasthan and UTs of Diu, Daman, Dadra & Nagar Haveli. The Ministry of Housing and Urban Affairs (MoHUA), Government of India added States of Assam and Tripura from February, 2012 and Lakshadweep from August 2017 to the domain of RCUES of AIILSG, Mumbai. The RCUES is supported by the MoHUA, Government of India. The MoHUA, Government of India has formed National Review and Monitoring Committee for RCUES under the chairmanship of the Secretary, MoHUA, Government of India. The Principal Secretary, Urban Development Department, Government of Maharashtra is the ex-officio Chairperson of the Advisory Committee of the RCUES, Mumbai, which is constituted by MoHUA, Government of India.

The RCUES was recognized by the Ministry of Urban Development, Government of India as a National Training Institute (NTI) to undertake capacity building of project functionary, municipal officials, and municipal elected members under the earlier urban poverty alleviation programme-UBSP. The RCUES was also recognized as a Nodal Resource Centre on SJSRY (NRCS) and Nodal Resource Centre (NRC) for RAY by Ministry of Housing and Urban Poverty Alleviation, Government of India.

The AIILSG, Mumbai houses the Solid Waste Management (SWM) Cell backed by the Government of Maharashtra for capacity building of municipal bodies and provide technical advisory services to ULBs in the State. The Water Supply & Sanitation Department (WSSD), Government of Maharashtra (GoM) established Change Management Unit (CMU) in AIILSG, Mumbai from 13th January, 2010 to 30th June, 2014 and also selected AIILSG, Mumbai as a Nodal Agency in preparation of City Sanitation Plans for 19 Municipal Corporations and 15 A Class Municipal Councils in Maharashtra State, under the assistance of Ministry of Urban Development, Government of India. The WSSD, GoM also established Waste Management & Research Centre in AIILSG, Mumbai, supported by Government of Maharashtra and MMRDA.

In August, 2013 Ministry of Urban Development, Government of India empanelled the AIILSG, Mumbai as Agency for providing technical support to the Cities / Towns of States / Urban Local Bodies (ULBs) in the field of Water Supply and Sanitation, Sewerage and Drainage systems.

In July 2015, Ministry of Urban Development, Government of India empanelled the RCUES & AIILSG, Mumbai an Agency for technical support in Municipal Solid Waste Management under Swachh Bharat Mission (SBM) programmes.

In February, 2016, Ministry of Housing and Urban Poverty Alleviation, Government of India empanelled the RCUES of AIILSG, Mumbai for conducting training and capacity building programme for experts of SMMU, CMMUs, COs, Key Officials and other stakeholders of the State and Urban Local Bodies (ULB) level under Deendayal Antyodaya Yojana – National Urban Livelihoods Mission (DAY – NULM).

In December, 2017, AIILSG has been empanelled as a training entity regarding implementation of new Integrated Capacity Building Programmes (ICBP) under Urban Missions, viz. Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Swachh Bharat Mission (SBM), Smart Cities Mission (SCM), National Urban Livelihoods Mission (NULM), Housing for All (HFA), Pradhan Mantri Awas Yojana (PMAY) and Heritage City Development and Augmentation Yojana (HRIDAY) for Elected Representatives and Municipal Functionaries.

At present, RCUES and AIILSG, Mumbai is involved in providing capacity building, research and technical support to number of State Governments and ULBs for implementing various urban development missions and programmes launched by the GoI.

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The Urban World - Quarterly Publication of Regional Centre for Urban and Environmental Studies of All India Institute of Local Self Government, Mumbai

(April - June, 2019)

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The opinions expressed in the articles / presentations herein are those of the authors. They do not reflect the opinions of the Regional Centre for Urban and Environmental Studies, All India Institute of Local Self Government, Mumbai, Ministry of Housing and Urban Affairs, Government of India or Publisher.

Printed at **Copytronics** Bandra (E), Mumbai.

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Editorial

Grow we must, yet sustainably

Initial estimates put the economic loss due to the impact of Cyclone Fani at over Rs 100 billion. The State has been subjected to nature's fury at regular intervals over the years in the form of cyclones. Thankfully this year loss of lives was minimized greatly due to some good advance precautionary measures taken by the authorities. Another recent newspaper headline says that a southern state is considering cloud seeding amid forecasts for a deficient monsoon. Frequent occurrence of such extreme climate events is devastating many parts of the world apart from India.

Rapid and relentless urbanization is among the factors adversely affecting our planet. The phenomenon is leading to widespread deforestation, diminishing urban green spaces, unsustainable groundwater extraction and encroachment of ecologically fragile wetlands; growing consumerism is creating mountains of waste choking our rivers and water bodies. Developing economies including India are particularly vulnerable; on the one hand they need a few decades of high and rapid economic growth in order to pull millions out of poverty; at the same time these very poor are the most vulnerable to the fury of extreme climate events that could arise from higher Green House Gas (GHG) emissions driven by faster economic growth. Therefore the developing world must find ways to decouple economic growth from environmental degradation. Some opportunities do exist.

The transport sector, driven mainly by burning fossil fuels, is an important contributor to GHG emissions. The number of motor vehicles (other than two-wheelers) per 1000 population in India is a low 22 against 837 for the USA, 589 for Germany and 173 for China. Economic growth in India could drive this number much higher and therefore the emissions too. However the world now has access to more sustainable technologies including e-mobility. Therefore we can leapfrog the growth ladder using e-mobility rather than endure the severe environment damage that growing fossil fuel based mobility would entail. Similarly India's power consumption is about 1000 kWh per capita per year. For Japan the figure is about 7000 and for the USA about 12000; so one can imagine the huge increase that can happen as India grows and also since electrification has now reached most remote villages. Considering that about a third of all GHG emissions happen due to electricity generation, the increase in emissions could be dramatic if electricity consumption were to grow to developed nation levels. Fortunately we have access to viable renewable energy

Editorial

sources. India is one of the nations at the forefront of green energy generation. Therefore our economic growth and per capita energy consumption growth can come from renewables without the environmental degradation that conventional sources would entail.

The world has long been used to the argument that environment degradation is the price we must pay for faster economic growth. Not anymore. The International Energy Agency had reported that there had been virtually no increase in energy related CO₂ emissions in 2015 compared to the previous year. This happened for the second straight year. Importantly these years were marked by world economic growth, not weakness. India has declared that it will reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level. It expects that its share of renewables in the total installed power generation capacity will be 40 percent by 2030.

Clearly the world is concerned and individual countries are battling the threat on many fronts. It is a battle we must win because this is the only planet we have.

In this issue of The Urban World, among others, we carry an article detailing India's actions on Climate Change. We trust readers will find this issue engaging.

Equal World Equal Spaces - Work Related Health Issues

Dr. Sunita Kaistha

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Women's Participation in the Labour Market

In recent decades, gender perspective in research has made important contributions to working life, though most of the research within this area is considered gender neutral, in which gender as a social category has no significance. But, for a number of reasons it is important to impose a perspective of gender on women's and men's working life. One fundamental reason is that it is assumed that the conditions in working life are the same for both women and men.

According to a 2017 Organisation for Economic Cooperation and Development (OECD) report, the unequal distribution of unpaid work between men and women is one of the most important gender equality issues in many countries with impact on pay gaps and career progression. It further quotes “This means women have less leisure time than men, and fewer opportunities to network. For example, it's harder for women to hang on after work to build contacts if they want to go for promotion – all of these things that we know make a difference are much tougher for women.”

While more women are in paid work than ever before, for many people the traditional, archaic ideas of what a man and women “should” do in the household linger on. Frances O'Grady, the first female general secretary of the UK's Trades Union Congress reiterated that “women are still doing the double shift of a job and most of the housework, plus caring responsibilities – and it leaves a lot of women knackered.”

The stage is set to comprehend the complexities of the social fabric that have been redefined by the shifting status of women. In the long run this will have direct influence on labour participation, natural population growth, family formation and the quality of life, as also *implications on health especially to life- style related diseases*. What does it mean to be a woman or a man if you want to combine a qualified full-time job with the role of a spouse and parent? There is a definite need for adequate responses to women's realities which connect their two worlds: work and home.

The household and family with a woman in the home was the basis for the first welfare policies in the Nordic countries. Production was organized on the assumption that its workers had a woman's support at home (Baude and Gonäs 1989). To ensure his and his family's survival, it was important for the man to receive financial compensation for income lost due to injury, death, or unemployment.

The changing world of work has shown an increasing trend of shifts from rural work, as also from industry and manufacturing. Today there is an increase towards the service and the IT sector, wherein new types of work and forms of working are being created. Increased competition and pressure to rationalise and be more flexible have been the hallmarks of globalisation. An important change of this trend has been the entry of more women into the labour market.

Gender Differences in Work

Paid work that is compatible with women's and men's shared responsibility for unpaid care and domestic work as well as leisure and learning, where earnings are sufficient to maintain an adequate standard of living and women are treated with respect and dignity, is crucial to advancing gender equality. Yet, this type of work remains scarce and economic policies in all regions are failing to generate enough decent jobs for those who need them. The vast majority of women still work in insecure, informal employment.

There is a strong segregation of tasks between men and women, between sectors, between jobs in the same sector, and even in the jobs having the same job title there can be segregation. The structures in a work organization are often seen as gender neutral, as independent of whether the organisation's members are women or men. But there is a strong vertical segregation within workplaces, when men are more likely to be employed in more senior positions.

Occupations that are disproportionately populated by women tend to be poorly paid. There is unassailable evidence that women's work is marred by a gender-based division of labour and discrimination. Women are often made to occupy informal, casual, temporary, low-paid, self-employed and 'mummy-track' jobs; they experience discrimination in the wages they receive and in access to social security benefits. Women face particular challenges stemming from their dual role as caregivers and breadwinners, and the lack of recognition given to their care responsibilities.

Because of strong gender segregation in occupations which continues despite changes in the world of work, women and men continue to be exposed to different workplace environments,

different types of demands and stressors even though they are employed by the same sector and ply the same trade.

Health Dimensions of Work

Women provide the bulk of healthcare worldwide, both in the formal healthcare setting as well as in the informal sector and in the home. Women's household roles impact their health - such as exposure to smoke and women's limited engagement in physical work. These challenges do not have their solutions rooted in medical health but a holistic approach to public health and inter-departmental partnerships. Yet women's own needs for healthcare are poorly addressed, especially among rural and poor communities.

Gender inequality both inside and outside the workplace can affect women's occupational safety and health and there are important links between wider discrimination issues and health. Studies have shown that lack of literacy and poor health compromises women's upward mobility at every rung of the ladder. Similarly, poor health has resulted in higher MMR (Maternal Mortality Rate) and IMR (Infant Mortality Rate) endemic anaemia, frequent pregnancies, etc. amongst women, primarily because of poor access to knowledge. Lack of awareness about sanitation impacts health negatively with a close link between malnutrition and poor sanitation having been established. Gender differences in exposure to hazards and health outcomes are also caused by gender differences in both working conditions and gender segregation of the work force.

'Men die quicker, but women get sicker' is an oft-quoted saying. Though women live longer than men, their quality of life tends to be poorer, particularly in their final years. Life expectancy for

women is 83, 3.5 years longer than men. Women are more likely to experience an increase in non-communicable diseases like back and neck pain, depressive disorders and respiratory diseases.

Paid work has positive emotional and social implications that contribute to well-being, and it also positively affects economic well-being; the participation of women in the labour market generally appears to be positive for their health. Research evidence also suggests that the physical and mental health of working women is better. In other words, working life may increase stress but it also offers social contacts and other benefits that are not available at home. (Bildt Thorbjornsson, Lindelow, 1998)

Research must focus more on the total workload of both men and women who have chosen to combine an occupational career with family responsibilities as well as its linkage to health. To also find answers to the paradox - women generally report more health problems than men, but they usually live longer! What might be of interest is that studies in health concepts have identified stress to have become a central theme among women when they were asked to identify three main health problems.

One important factor that is linked to improving the employability of women and men and the quality of working life is to ensure that both women and men do not have to leave the workforce because of injury or ill-health. It is important that work is compatible with home life and work is both safe and healthy whether it is construction or nursing.

Prevention of work-related deaths, injuries and ill health is important because, failure to do so results in high costs to enterprises/organizations, to society and to the individuals concerned. Though it is important that risk assessment as well as prevention must be done for both male and female workers, for

various reasons more attention has been paid to risks male workers face and their prevention. On the other hand, *risks to women workers may be underestimated or ignored altogether.*

Occupation Related Health Outcomes

Women and men have a number of similarities and differences, but it is in the field of health and illness they differ in all aspects, that is – biological, psychological, social and cultural. Hence, where necessary the healthcare offered to men and women should also differ. Men have more work-related accidents whereas women suffer more work-related ill health.

Work related upper limb disorders are associated with poor postures, highly repetitive movements, forceful movements, fast paced work, hand - arm vibration, work in cold environment and psychosocial factors including work related stress.

Back disorders are associated with manual handling work, where risk factors include the weight of the load, frequency of manual handling work and awkward postures. They are also associated with awkward postures in general, including prolonged sitting and poor seating, as well as prolonged standing. These risk factors are found in many of the jobs women carry out.

Examples of work related musculoskeletal disorders have been found in manufacturing; assembly line manufacturing, poultry and fish processing, cleaners, kitchen workers, and cashiers in supermarkets, among garment workers, women working in packing jobs, textile manufacturing, electronics.

Furthermore, female nurses perform more heavy lifting of patients compared to male nurses, who are more likely to be engaged in managerial tasks or in surgery or intensive care areas where lifting work is

less. Female agricultural workers may also have to carry out heavy physical work and work in awkward postures, such as stooping positions. National Institute for Occupational Safety and Health (NIOSH)

Research evidence suggests that using a computer for six hours or more per day appears to be associated with increased risk of upper limb disorders. There is some evidence that this association is stronger for women than men and symptoms can already be observed after four hours computer use per day (Blatters and Bongers, 2002). Many studies find that employed women have higher levels of stress and distress than employed men (Williams and Umberson, 2000). In the service sector for example, responsibility to multiple supervisors, unclear work expectations are stressors which are common. In women with caring responsibilities it is overtime work and unpredictable or inflexible scheduling which are stressors.

Monotonous work and low control are typical characteristics of female dominated occupations. In a study by Miller, et al (2000) little gender differences were found in sources of work stress among managers, but found that female managers experienced more distress. They hypothesize that the greater psychological and physical ill health reported by women is due to work/home overload and conflict. Also, women's double workload may increase the risk of stress related psychological disorders such as chronic fatigue, nervousness, anxiety, sexual problems and depression (Wedderburn, 2000)

A recent study from the Colorado School of Public Health's Centre for Health, Work and Environment suggests that anxiety, depression and fatigue increase women's risk of getting hurt at work. Researchers reviewed 17,000 workers' compensation claims

from 314 employers in different industries. They found that nearly 60 percent of women who were injured on the job reported a behavioural health condition before the incident occurred, compared with 33 percent of men.

“There are a number of social and cultural factors that may explain why women reported having more behavioural health concerns than men did,” Natalie Schwatka, lead author and assistant professor at the Colorado School of Public Health said in a Feb. 13, 2018 press release. “Men generally admit to fewer health concerns, and women may face different stresses at work and at home.” The researchers also found that both men and women were more likely to be injured at work if they had been injured before.

In another study from Ohio State University, researchers used data from the National Longitudinal Survey of Youth 1979 to examine 7,500 people who worked for 32 years. They found that women who work long hours for most of their career are at a higher risk of developing cancer, heart disease and other chronic diseases. As part of the study they compared hours worked to prevalence of heart disease, non-skin cancer, arthritis, diabetes, chronic lung disease, asthma, chronic depression and high blood pressure. Results showed that working an average of at least 60 hours per week for more than 30 years triples women's risk of developing diabetes, cancer, heart issues and arthritis. Risk escalated when women worked more than 40 hours per week and became severe at more than 50 hours per week.

In comparison, the risk of arthritis increased for men who worked long hours, but the risk of chronic diseases did not. Female workers tend to handle more family responsibilities than men, and deal with increased pressure and stress, researchers

stated “Women – especially women who have to juggle multiple roles – feel the effects of intensive work experiences and that can set the table for a variety of illnesses and disability,” Allard Dembe, lead study author and professor of health services management and policy at the university's College of Public Health, said in the press release. “People don't think that much about how their early work experiences affect them down the road. Women in their 20s, 30s and 40s are setting themselves up for problems later in life.”

The researchers recommend that employers offer flexible hours at work, health coaching and health screenings to help reduce the risk of chronic diseases among female workers. (The study was published online June 14, 2017, in the Journal of Occupational and Environmental Medicine).

Conclusions and Recommendations

The advancement of gender equality and equity, empowerment and elimination of discrimination, are critical to women's health and well-being. This can only be achieved by including the gender dimension in planning health programs and research.

Women work and health congress

A very successful initiative to improve the situation for women's occupational safety and health took place in Spain 1993. This initiative has had a great importance for the interchange and stimulation of research, knowledge and actions in the field of women, work and health. The Centre for Analysis and Sanitary Programs in Barcelona organized an International Workshop 'Women, Health and Work' in 1993. At this workshop the participants decided to launch the International Congress on Women, Health and Work with the intention to gather research and knowledge about the differences between disease in women and men.

The *first* Congress “Women, Health, Work” took place in Barcelona, Spain 1996. The Congress decided to continue working as a network so as to preserve the information gathered from the research done by the different groups. Another important outcome from the Congress was the intention to make special efforts to introduce gender issues and point out differences in disease for women and men at universities and at all teaching levels in Health Sciences.

The *second* Congress was held in Rio, Brazil 1999 and the outcome was a wide variety of approaches, experiences and proposals. A network was formed especially from among interested parties within Brazil but some other Latin Americans participants also planned to be part of the network. From the scientific point of view the most important subjects were verified and new issues added about the relationship between gender, work and health. There was widespread participation from Latin American, Canadian and French Post-graduate students, who exchanged points of view. Agreements were also made for important cooperation in research.

The *third* Congress was held in Stockholm, Sweden 2002 with the intention of having an international and interdisciplinary Congress to bring together scholars, activists, representatives of civil society organizations and trade unions, of government agencies and persons involved in practical work from all parts of the world for critical discussions on questions related to women's working conditions, their living conditions and gender-specific issues related to health/ill health. The intention was to continue the intense debate that started in Barcelona and Rio de Janeiro and to leave a legacy in practice. Therefore, sessions were organized to discuss how best to disseminate information related to women, work and health and how to develop change in practice.

One of the main outcomes of the Congress was the creation of different working networks (the most important was an African network) on women's health and work, but there were also reports on the implementation of research that favours people. Another outcome originated from a World Health Organization (WHO) Symposium at the Congress, *A publication titled "Gender and Work-related Health Issues: Moving the Agenda Forward" was planned for and the contributions to the Symposium provided valuable input to an overview paper published by WHO.*

The **fourth** Congress was held in New Delhi, India 2005 and was centred around the main themes gender, paid and unpaid work, the changing world of work and scientific health practiced in development. The choice of these themes by the organizers of the Congress was a result of preparatory country-wide regional workshops where researchers, non-governmental organisations, trade unions and persons involved in practical work gathered and discussed gender, work and health issues.

In India, as in other developing countries, women have always worked in informal sectors, and their work is not acknowledged as such. The work of women is still ignored in the agendas of countries such as India, as well as their security and health, including their reproductive health. An initiative called "Woman, Work and Health Initiative Asia" (now called (WWHI)) was created for the advancement of the research findings linked to the reality experienced by women, so as to have a positive impact in their lives and work conditions.

The mission of this initiative is to:

- recognize women's work in its entirety in the organized and unorganized sectors and the domestic sphere.
- create awareness on women's issues e.g. gender discrimination, decent work, violence at work and home, knowledge dissemination, life style

related health issues, adult literacy and sustainable development.

The **fifth** Congress was held in Zacatecas in Mexico 2008 with the general objective to give continuity to the four previous events, in respect to the discussion and creation of an agenda focused on women's work and health issues, as well as organizational issues. The following specific objectives were considered:

- to make progress in the discussion on the main subjects related to women's work and health issues at the local, national, Latin American and international levels.
- to make progress in the organization of women for the improvement of paid and unpaid work conditions at the local and global levels.
- to propitiate / promote the coordination of efforts amongst all actors whose mission is a commitment towards women, focused on work and health issues.

Some of the themes discussed at the Congress included: Situation of the Work Market, Non-remunerated Work, Work Organization, Work Conditions and Work Environment, Public and Private Policies, Rights and Justice, Methodologies (training, action, human resources education and research).

The most important objective for the fifth Congress was to generate for Latin America an initiative similar to that of Asia Initiative on Women, Work and Health. The Congress was successful in reaching that goal besides other more specific recommendations that were put forward as results from the Congress.

The series of Women Work and Health Congresses have played an important role as they have opened up an interchange of knowledge between developed and developing countries and between researchers,

different organisations, unions, persons involved in practical work with the focus on issues that are central above all for women and their conditions of work and health.

References

1. Bildt, C; Michelsen, H. (2002) 'Gender differences in the effects from working conditions on mental health: a four year follow up, 'International Archives' of Occupational and Environmental Health 75, pp 252-258.
2. Bildt, C., Gonas, L., Karlqvist, L. and Westberg, H. (eds) (2002), *Women work and health-IIIrd international congress -- Book of Abstracts*, Arbetslivinstitutet, Stockholm.
3. Bildt Thorbjornsson, C. and Lindelow, M. (1998) 'Psychiatric ill health and conditions at work', in Kilbom, A. Messing, K. and Bildt Thorbjornsson, C. (eds), *Women's health at work*, Arbetslivinstitutet, Stockholm, Sweden.
4. Blatter, B. M. and Bongers, P. M. (2002) 'Duration of Computer Use and mouse use in relation to musculoskeletal disorders of neck or upper limb, 'International journal of Industrial Ergonomics 30, pp 295-306.
5. Dogra, A, Kaistha, S., (eds 2005) *Women work and health- IVth International Congress -- Book of Abstracts*, Manana, New Delhi, India.
6. Dembe., A. (2017) *Journal of Occupational and Environmental Medicine (2017) Study by Ohio State University College of Public Health*
7. Ghosh Jayati (2009) *Never done and Poorly Paid - Women's work in Globalising India-Women Unlimited (an associate of Kali for Women) New Delhi.*
8. Kauppinen, K., Kumpulainen, R., Copsey S., (ed) (2003) *Gender Issues in safety and health at work – A Review*, European Agency for Safety and Health at Work Office for Official Publications of the European Communities, Luxembourg.
9. Merens, A., van den Brakel, M. (2014). *Emancipatiemonitor 2014. The Hague: SCP/CBS.*
10. Miller, K., Greyling, M., Cooper, C. L, Li, L. and Sparks, K. (2000), *Occupational stress and gender a cross- cultural study.'* *Stress Medicine* 16, pp 271-278.
11. Norton R, Peters S, Jha V, Kennedy S, Woodward M. *Women's Health: February 2016. A New Global Agenda. Oxford Martin Policy Paper. Oxford Martin School, University of Oxford.*
12. Wedderburn, A. (ed) (2000) *Shift work and health, European foundation for the Improvement of Living and Working Conditions, Office for Official Publications of the European Communities, Luxembourg.*
13. Westberg, H. (1998) 'Where are women in today's workplace?' Kilbom, A. Messing, K. and Bildt Thorbjornsson, C. (eds), *Women's health at work*, Arbetslivinstitutet, Stockholm, Sweden.
14. Westberg., H. (2009) *Gender and work* Elgstrand, K. Petersson N. F. (eds) *OSH for Development, Royal Institute of technology Industrial Ecology, Sweden.*
15. Williams. and Umberson, D. (2000), 'Women, stress and health,' in Goldman. and Hatch, M. (eds) *Women and health*, Academic press, san Diego, San Francisco, New York, Boston, London, Sydney, Tokyo.

Reports, etc.

1. *Feb 2018 Press Release Colorado School of Public Health's Centre for Health, Work and Environment Natalie Schwatka (lead author).*
2. *Dutch Gender and Health Knowledge Agenda, (May 2015). Henk J. Smid, ZonMw director Gender and Health Knowledge Agenda, The Hague.*
3. *Institute for Health Metrics and Evaluation, Global Burden of Disease, 2013.*
4. *MDG India Country Report - 2015, Government of India.*
5. *The George Institute for Global Health India, May 2016- Framing Women's Health Issues in 21st Century India - A Policy Report.*
6. *UN Women 2015 – Progress of the World's Women 2015-16. Transforming Economies, Realizing Rights.*
7. *WHO (2010) Global Status Report on Non-Communicable Diseases, 2010.*
8. *WHO Road Map for Action (2014-19). Integrating equity, gender, human rights and social determinants into the work of WHO. WHO, Geneva, 2015.*



Analysis of Factors Contributing to Successful Cleanliness of Public Toilets

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Swachh Bharat Mission (Clean India Mission), launched by Prime Minister Narendra Modi on 2 October 2014, has a major aim of making India free of open defecation. The mission saw the construction of several lakhs of toilets all over the nation; the real task is their maintenance and upkeep.

While its usage could vary with the location, a public toilet in any case would be used by a huge number of individuals. However, regardless of the extent of usage of a public toilet, it is necessary to keep it as clean as could be expected under the circumstances.

Public toilet provision and its cleanliness demand strong emphasis as a part of a city's infrastructure. However, Navi Mumbaiers do not enjoy the basic hygiene of clean present day sanitation and other essential facilities of an advanced cosmopolitan city like Mumbai; this should happen at the earliest.

This study is a synthesis of the findings of different factors to maintain the cleanliness of public toilets, which also include smart technologies contributing to the upkeep and addressing the barriers in order to help in determining the outcome of a well-equipped and clean toilet.

Keywords:

Public toilet maintenance, Smart Technologies, Navi Mumbai

1.0 Introduction

A major public health and sanitation problem in India is Open Defecation and toilet is often considered as issue not worthy of discussion. Public toilet provision and its cleanliness is demanding strong emphasis as a part of city's infrastructure; it is also included in the Swachh Survekshan 2018 toolkit. Individuals prefer to defecate in the open since they find that utilizing un-clean toilet and paying for it is not worth.

According to the Swachh Bharat Report of the National Sample Survey Office (NSSO), released in 2015, more than half of the rural population of the nation still defecates in the open, which is an alarming public health and sanitation problem. Public toilets are un-hygienic which discourages people from using them. The city authorities pay more attention towards water supply and sewerage under the head sanitation. This 'Build-Neglect-Rebuild' culture has led to the wastage of government efforts. Although external agencies are operating some public toilets, there are no clear insights into the quality of work, water usage, and number of people using these toilets.

For enhancing the cleanliness and to improve the public toilet facilities and their usage, it is necessary to understand the existing system to formalise or measure cleanliness in public toilets. Numerous innovative technologies have been created to enhance cleanliness of public toilets and

the city of Navi Mumbai has adopted a few of these technologies.

This study includes factors that contribute to the successful maintenance and cleanliness of public toilets in Navi Mumbai. Incorporating these five factors will improve the overall sanitation scenario. These factors have been studied with the help of various operational tools in order to understand the existing system.

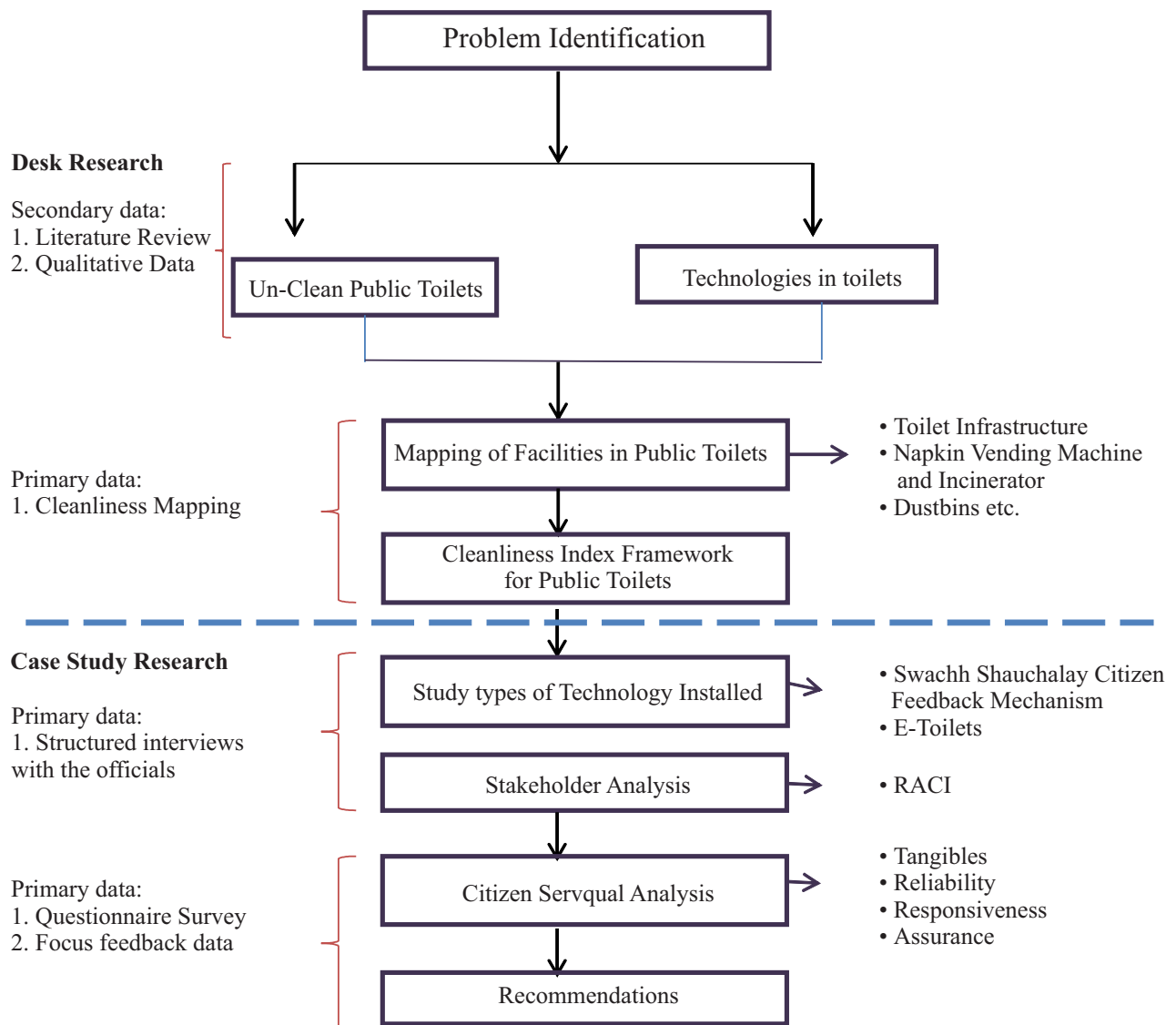
2.0 Methodology

Figure 1 shows the methodology of the study in Navi Mumbai. Literature review, site visits and a pilot survey were necessary to understand the existing sanitation scenario. Data analysis has been carried out with the help of different service operational tools.

2.1 Literature Review

Urban Management Centre (UMC) carried out a technical research on which Greater Visakhapatnam

Figure 1: Methodology for Study



Municipal Corporation (GVMC) made an action plan in order to recognize its vision of a Swachh Visakhapatnam. The audit included understanding the existent system of database and surveying how it could be enhanced towards the particular target of better execution of SBM initiatives (UMC).

The Swachhata index included three indicators - Output indicator, Process indicator and Outcome indicator. The output indicator included the adequacy of toilets for men and women, efficiency in redressal of sanitation related complaints, cleaning of septic tank, drinking water stations and overhead tank. On the other hand process indicator included hygiene related Information Education and Communication (IEC) activities, disposal of e-waste, disposal of furniture and other large items. Outcome indicators included cleanliness of toilets (UMC), Sanitation Index indicators for monitoring cleanliness under the Mahatma Gandhi Swachh Mission (MGSM).

Quality and usefulness are basic requirements for the use of Public Toilet. This pointer inspects whether a Urban Local Body (ULB) gives citizens a mechanism to find toilets and give criticism about the functionality through an Information Communication Technology (ICT) component, for example, the Google Toilet Locator and Feedback Monitoring System (Wall-Mounted). Total of 16 marks are allocated for installation of this system (toolkit, 2018).

It is a technological intervention to plug the gap of unclean toilets, and which aims to address the issue by installing a feedback mechanism which can be retrofitted in any existing toilet and is highly affordable; which will increase operational efficiency, data driven decision-making and customer satisfaction. The device has three buttons, green, yellow and red. In the event that you are happy with your visit, press the green button; the red button signifies you are troubled with the experience while the yellow button indicates a neutral experience. The input will be observed through an online dashboard.

In case a toilet gets consistent negative feedback, the system will send a SMS message to the foundation operating the place, advising them to improve their facility (Gaia n. d.)

E Toilet intertwines full cycle approach in maintenance of sanitation by combining of gadgets, mechanical devices and other technologies and in this way controlling its operations. The insertion of a coin opens the entryway of the e Toilet for the customer, switches on a light (therefore saving energy during non-use), and even assists the person with sound commands. The toilets are programmed to flush 1.5 litres of water following 3 minutes of utilization or 4.5 litres if utilization is longer (Pareek, 2014).

3.0 Factors for Maintaining Cleanliness in Public Toilets

Implementing these five measures mentioned below will improve the overall sanitation scenario. These measures have been studied with various service operation tools.

3.1 Defined Roles and Responsibilities

In order to study and analyse the roles and responsibilities of public toilet management team, for this study service operation tool called RACI Matrix has been used. It is a service operation tool useful in clarifying roles and responsibilities in cross-functional/departmental and public private partnership projects. RACI is an acronym derived from the four key responsibilities most typically used: Responsible, Accountable, Consulted, and Informed.

Through RACI Matrix we observed that overlapping of roles and responsibilities of authorities for ensuring consistent cleanliness by cleaning staff, contractor and sanitary inspector causes activities like passing the part of your responsibility to others. For the activity of resource allocation there was no accountability which is a major gap as it is very important to have a person

Table 1: RACI Matrix

RESPONSIBILITY NAME	ROLE OF PARTICIPANTS								
	Citizens	Cleaning Staff	Contractor	Sub Sanitary Inspector	Technical Engineer	Sanitation Officer			
Cleaning of Public Toilet		R	A	I					
Providing Resources			R	C		No Accountability			
Ensure Consistent Cleanliness		R	R	R	A	Overlapping of Roles			
Repair Work	Slows down the work		R	C	A	C	C	I	
Providing Feedback	R		C	I					
Overall monitoring	Confusion on decisions		R	A	R	A	A	C	I
Collection of fee		R	A	C	I				
Commissioning public awareness campaigns				R	A		C	I	
Setting performance standards		No Accountability		R			C		
Record no. of people		R	A	I					

who is accountable or else the contractor who is responsible to provide resources will not perform his responsibility efficiently. Repair work is one activity that is very important as without repairing, comprehensive functioning of toilets is a problem, for this activity sub sanitary inspector, technical officer and sanitation officer are consulted which eventually slows down the work as there is a lot of time taken for process approval. Next activity which has a loophole is the monitoring of the overall public toilet service, in which contractor, sub sanitary inspector, and the technical engineer all the three are accountable which naturally causes confusion on decisions of overall monitoring.

3.2 Contracts and Agreements

The government is responsible for providing basic services to the public by creation of the necessary infrastructure. But they may differ in how they are created, procured and delivered. Since the report will further focus on analysing the contract of a public toilet, which is an infrastructure provision, it

is important to look at the different ways in which it can be done. A public toilet maintenance contract should be well-defined and must include all specifications required for efficient service delivery. It is very important to include penalties, control and performance in order to ensure successful functioning of public toilets.

Analysis of Public Toilet Contract

The contract missed out on these major points which needed to be incorporated:

- *Maintenance Requirement and Operating Procedures*

Details about the specifications and standards stating till what level should the work of maintenance and cleaning should be done. Activities like sequence of cleaning, inventory management, time of cleaning should be included and reported to the concerned contractor to bring in enforcement and control in the maintenance and operations work.

- **Training of Care-taker and Cleaner**

Proper training must be given to the care taker and cleaner on functioning and O&M of the site. The constructor shall conduct the training as agreed via a qualified instructor who possesses the knowledge of the installations. Training is extremely important in order to maintain discipline and maintain the toilets satisfactorily.

- **Monitoring Mechanism**

Without monitoring and regular follow ups it is impossible for the toilet management system to work successfully. Monitoring by the contractor as well as the Municipal Corporation is very much required with proper checklists and framework to avoid missing out on any facility. Monitoring the performance of the workers will help in identifying the mistakes and errors they are committing while maintaining the toilet, which will also bring in some level of control within them.

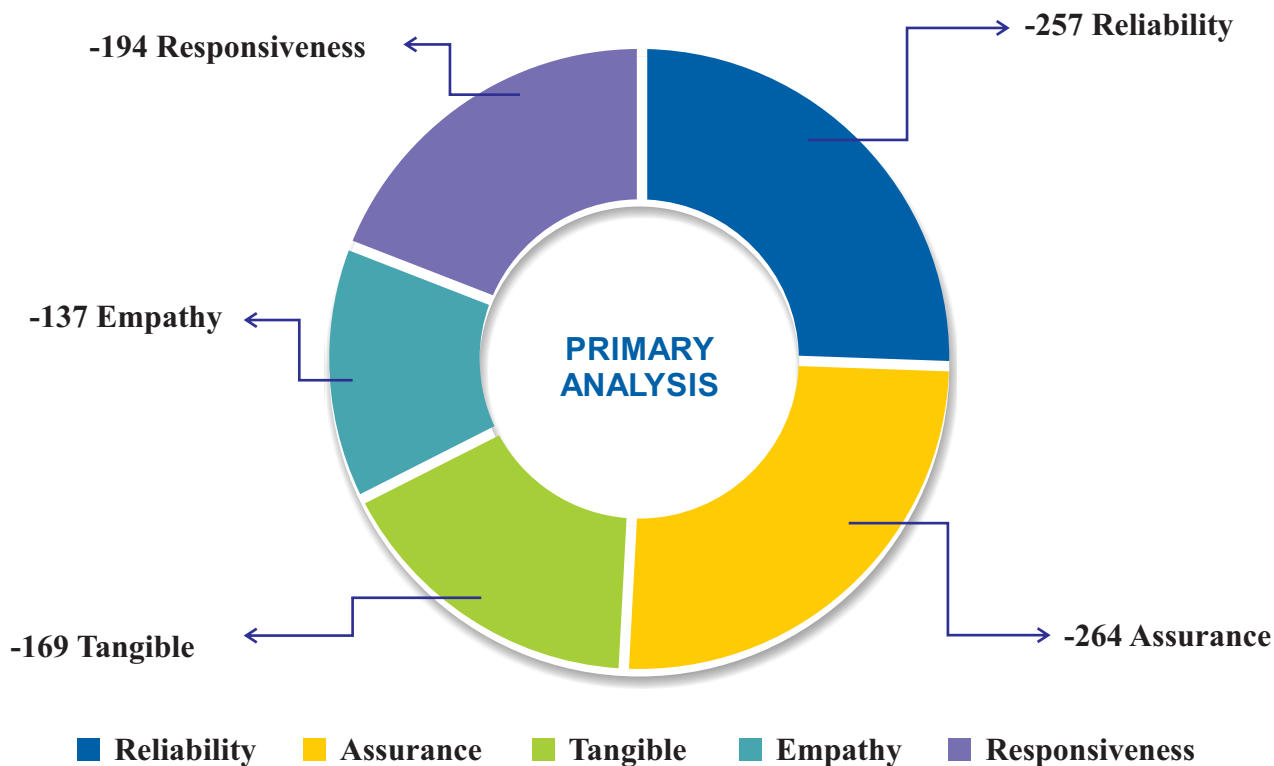
- **Motivational Incentives**

Incentives for cleaners and care takers are very important so that they perform their duties up to the mark with optimistic attitude. It will also increase productivity and ensure quality of the work.

3.3 Quality of Public Toilet Service Delivery

Delivering quality service means conforming to user's expectations on a consistent basis. For the study of user's perception on the quality of public toilet service delivery, a service operation management tool called SERVQUAL (Service Quality) has been used. It is a multidimensional instrument, which is intended to capture users or service receiver's expectation and perception of a service along five different dimensions that are believed to represent service quality. It will generally have 22 questions on five dimensions. It is RATER in short which represents Reliability, Assurance, Tangibles, Empathy, and Responsiveness.

Figure 2: RATER Questionnaire Analysis



- **RATER Questionnaire Analysis**

Post survey analysis it was observed that there were 3 main issues that needed to be addressed. Following are the areas which require immediate attention:

- 1. Work performance by cleaning staff not satisfactory**

No training provided to the cleaning staff in order to maintain cleanliness which also reduces the discipline and causes lack of motivation among the cleaning staff.

- 2. Lack of maintenance of cleanliness in public toilets**

The overall cleanliness of public toilets was rated poorly by users, mainly due to the odour in the toilets and limited monitoring in public toilets causes unhygienic conditions.

- 3. Condition of infrastructure has deteriorated due to poor maintenance**

Lack of supplies and broken infrastructure which needs to be informed to the municipal corporation in order to fix the toilet facilities which will smoothen the usage of public toilet service.

3.4 Citizens Feedback Mechanism

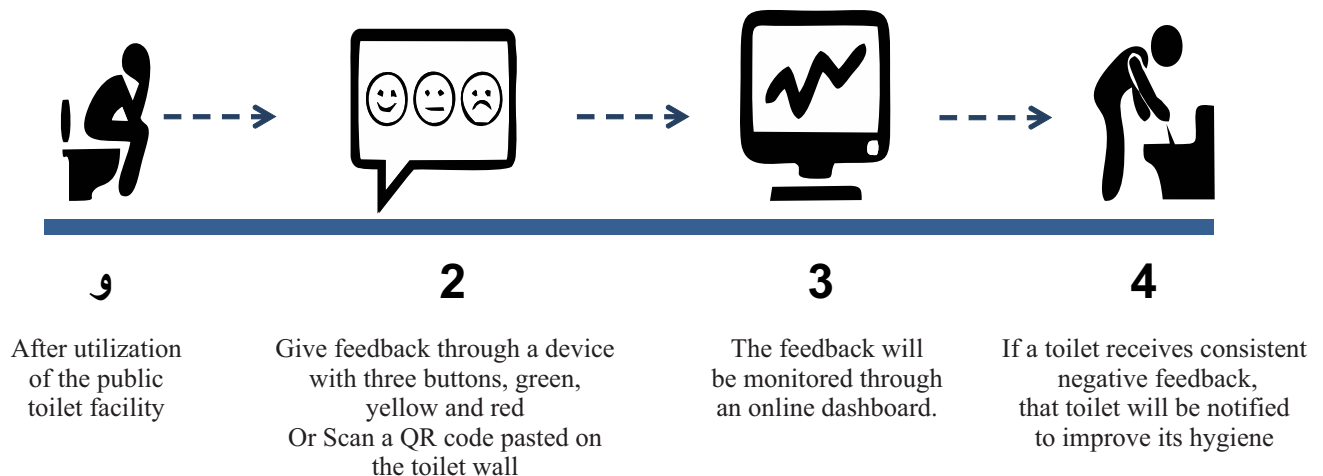
Government works best when citizens are directly engaged in public service delivery. Taking citizen feedback is extremely important as the needs and requirements of the public are directly presented to the government who can take appropriate action to bring in control and upgradation. This feedback system includes three buttons - red for bad, yellow for neutral and green for good, the feedback captured will be monitored through online dashboard.

Obtaining citizen's participation can improve quality of public toilets thereby enabling user satisfaction and achieving the overall service delivery objectives.

In order to validate the captured feedback, a pilot analysis of three nodes were selected which are Vashi, Nerul and Belapur. These nodes were selected because they have the highest demand and coverage of public toilets as compared to the other nodes. From each node 6 toilets were selected on the basis of the feedback received. In all 24 toilets were mapped and comparison was made of toilets getting a good feedback with toilets getting a negative feedback consistently throughout the month.

Public toilets getting consistently good feedback had all the facilities required in the toilet except for

Figure 3 : Citizen’s Feedback Mechanism in Public Toilets



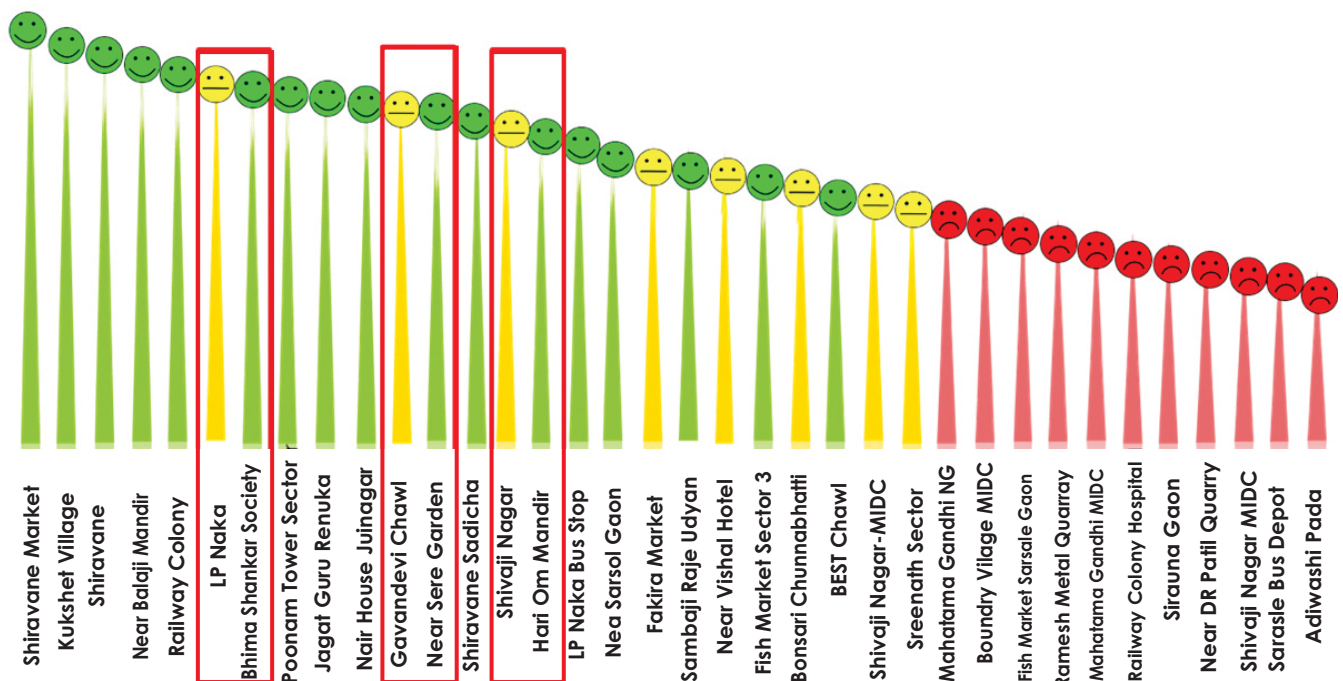
mirror and dustbin for disposal of sanitary waste. In the toilets where there was consistently bad feedback there were no wash basins and out of 3 toilets mapped only 1 toilet had urinal; rest of them did not have a urinal facility. Negative feedback was also due to broken infrastructure and bad odour which contributed to the problem of unhygienic public toilets. The above feedback system helps us to identify the unclean toilets.

Mapping of 36 public as well as community toilets in Nerul node and assessing all aspects of adequacy of the toilets was done. Nerul node consists of different types of land use - Residential, Industrial, Commercial, Recreational, and Institutional. There are total 36 community and public toilets in Nerul in which this feedback system is installed. The maintenance of these toilets has been outsourced to Sulabh International Social Service Organisation.

These 36 toilets were mapped with different parameters; these parameters were divided into 2 categories. The first category was the 'must haves' which included the necessary infrastructure without which it is impossible for proper functioning of the toilet. The second category is the 'good to have' category which included parameters which are an additional amenity.

Each of these parameters was marked on the basis of its working conditions and adequacy. The 'must have' parameters which are the water closet, urinal, wash basin, water tap, dustbin, accessibility, ventilation, frequency of cleaning were marked on the scale 2 marks each, whereas the 'good to have' parameters which are mirrors, sanitary waste disposal, odour, feedback system and seat for kids had 1 mark per parameter. After mapping each parameter and giving marks according to its working

Figure 4: Citizen Feedback Analysis



conditions a public toilet index was prepared in which these 36 toilets were ranked on the basis of the marks obtained by each.

Figure 4 includes ranking of toilets and the consistent feedback received in the last month. As shown in the figure toilet at LP Naka which has got satisfactory feedback, ranks 6th just ahead of toilet located at Bhimashankar Society. Similarly, the toilets located at Govandevi Chawl and Shivaji Nagar which also have satisfactory feedback have managed to rank better than the toilet located near Sere Garden and Hari Om Mandir respectively.

The overall public toilet facilities provided by the Navi Mumbai Municipal Corporation (NMMC) have definitely improved over a period of time as most of the toilets have access for differently abled, availability of dustbins and frequency of cleaning has increased which is as important as any other facility. Government works best when citizens are directly engaged in public service delivery. Taking citizen feedback is extremely important as the needs and requirements of public are directly presented to the government which takes appropriate action to bring in control and bring in

upgradation of the public toilet facility. Installations of feedback system are extremely effective as it is convenient to understand and discover the toilets that need attention. However, in some public toilets the infrastructure facility, is improper in context to Swachh Bharat Mission guidelines which requires provision of one urinal per 50 males, separate seat may also be provided for trans-genders, one washbasin per W. C. must be provided. Hence, immediate upgradation of infrastructure required in line with the Swachh Bharat Mission guidelines.

3.5 Smart Toilet System (E-toilet)

E-toilets is introduction of a technology intervention to change the overall sanitation environment. It is an innovative technology for disposal of human waste in an eco-friendly manner by integrating convergence of electronics, mechanical, web-mobile technologies thereby controlling entry, usage, cleaning, exit, and remote monitoring capabilities with multiple revenue options. E-toilets were introduced to address issues in sanitation like lack of appropriate maintenance, insufficient manpower to maintain toilet units and unscientific waste disposal methods.

Figure 5: E-Toilets



An automated toilet system which is activated and automatically operated electronically also includes automated cleaning mechanism. This technological intervention is contributing to the development in public sanitation. Cleaning and maintenance of E-toilets does not involve any human activity. This E-toilet system focuses on the “growth phase” of an idea and helps the government to implement the idea in such a way that it leaves a larger impact on citizens for optimum utilization of toilets.

● **Highlights of E-toilet Survey Analysis**

- Users preferred to use E-Toilet because they were easier to use and because they were clean.
- There is a need for a behavioural change among people who have technology phobia.
- E-toilet users had no hygiene, safety problems.
- Traditional toilet block users were worried about the functionality of an E-Toilet.
- Women E-toilet users had location safety problems

4.0 Conclusion

This study is a synthesis of the findings of different factors to maintain the cleanliness in public toilets and for addressing the barriers in order to help in achieving the outcome of a well-equipped and clean toilet. Lack of cleanliness was observed mainly because of four major reasons:

1. Absence of Monitoring and Controlling Framework

Due to the absence in monitoring framework one of the recommendations to tackle this issue is implementation of monitoring framework with the help of defined performance standards, in the form

of a checklist, based on this monitoring framework there can be control over the cleaner's service delivery.

2. Improper Training to the Staff

It is assumed that the cleaning staff is aware about their work and deliverables without providing a standard benchmark to maintain the toilet. This causes problem in service delivery. Therefore, to tackle this issue it is very important to provide step by step practice in the form of standard operating procedures.

3. Lack of Enforcement Mechanism

Details about each of the above mentioned framework should be included in the contracts, along with details about resources, equipment, etc. The contract should be a comprehensive one since without enforcement of these laws it is impossible to achieve the aim of clean toilets.

4. Lack of Motivation

Cleaning staff are not motivated enough to perform their job as they feel their job is a thankless one. In order to make them feel motivated, monetary and non-monetary incentives need to be incorporated.

References

1. *Borthakur, Anwasha, and Pradeep Singh. "Electronic Waste in India : Problems and policies." International Journal of Environmental Sciences 3, no. 1 (2012): 353-362.*
2. *Gupta, Reena, Sangita, and Verinder Kaur. "Electronic Waste: A Case Study." Research Journal of Chemical Sciences vol.1 (9) (December 2011): 49-56.*
3. *ECS Environment Website. June 2016. <http://ecsenvironment.com/eWaste.html>.*

4. *Central Pollution Control Board. "e-Waste" 2016.* <http://article.sapub.org/10.5923.j.ijas.20140402.04.html>.
5. *Sawhney, Puja, Mikael Henzler, Stefan Melnitzky, and Anita Lung. "Eest Practices for e-waste management in developed countries." 2008.*
6. *Government of India, Minsitry of Home Affairs. Census of India Website. 2011.* <http://www.censusindia.gov.in/2011-common/aboutus.html>.
7. *Ministry of Environment and Forests. "E-Waste (Management and Handling) Rules." 2011.*
8. *Ministry of Environment, Forest and Climate Change. "E-Waste (Management) Rules." 2016.*
9. *Maharastra Pollution Control Board. "Report on Assessment of Electronic Waste in Mumbai-Pune Area." 2007.*
10. *UMC. "Sanitation Mapping Visakhapatnam."*
11. *UMC. "Sanitation Index indicators for monitoring cleanliness under the MGSM."*
12. *Toolkit. Swachh survekshan. 2018.*
13. *Cities, Gaia Smart, Realtime Citizen feedback mechanism*
14. *Pareek, shreya. "E-Toilets." 2014.*
15. *Kumar, Abhishek. Impact assessment in urbanization. 02 04, 2011.* <http://www.indiawaterportal.org/articles/impact-assessment-urbanization-indian-city-ranchi-report-geospatial-world>.
16. *Neelmani Jaysawal, Sudeshna Saha. Scientific and Academic Publication. 2014.*
17. *2001.* https://www.vegvesen.no/_attachment/61652/binary/14462.
18. *Infrastructure and Services Assessment Framework for.* [http://www.jtsi.wa.gov.au/docs/default-source/default-document-library/infrastructure-and-services-assessment-\(isa\)-framework_1014.pdf?sfvrsn=12](http://www.jtsi.wa.gov.au/docs/default-source/default-document-library/infrastructure-and-services-assessment-(isa)-framework_1014.pdf?sfvrsn=12).
19. *Cherukupalli, Anil. "Finding toilets in India: Google to the rescue?" 15 March 2017.*
20. *Ibid.*
21. *Ibid.*
22. *Mannan, Libza. "In Tech for Impact's mission to clean up India." 2017.*
23. *unicef. 2017.* <http://unicef.in/Whatwedo/11/Eliminate-Open-Defecation>.
24. *UNICEF. December 2017.* <http://unicef.in/Whatwedo/11/Eliminate-Open-Defecation>.
25. *Mehta, Dinesh.* <http://www.ideasforindia.in>. April 23, 2014. http://www.ideasforindia.in/article.aspx?article_id=276.
26. *Mehta, Meera.* www.ideasforindia.in. April 23, 2014. http://www.ideasforindia.in/article.aspx?article_id=276.
27. *"Transforming India." 2016.*
28. *UMC. "Technical Audit of Public Conveniences facilities in ahmedabad."*
29. *Phansalkar, Dr Megha. "Sanitation Ammenities Management System." 2012.*



India and Climate Change

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India may be a land of over a 100 problems, but it is also a place for a billion solutions.

Kailash Satyarthi

Nobel Laureate

Physical Divisions of India and Nature of Predominant Activities

India is geographically, culturally and linguistically a diverse country. Geographically, it is divided into three broad divisions. The North India contains mountain range of Himalayas and the fertile plains lying between the Indus and Ganges, from Punjab in the west to Assam in the east. Desert region falls in the west in Rajasthan. Three plateaus of the Malwa, the Chhota Nagpur with their mountainous ranges lie in the centre and the Deccan Plateau separates the northern and southern India. The Southern peninsula lies between the Arabian Sea and the Bay of Bengal. It has two mountain ranges called the Western Ghat and the Eastern Ghat with strips of plain land between the sea and the mountains. These physical divisions make for its climatic variations. The south-west monsoon and the north-east monsoon bring rains to India. Agriculture and allied activities have been the predominant activities in India. The Census of India (2011) records that 833 million, i.e. 68.84 percent of Indian population lives in rural areas. Indian peninsula has a large coastline of 7517 kms. About 800 million population of India is engaged in agriculture and allied activities – farming, cultivation, plantation, horticulture, animal husbandry, poultry, fisheries, forestry, etc. which are climate sensitive sectors.

While the nature is bountiful to India, it also faces furies of nature like floods during monsoon, scanty

rainfall in the areas coming under the rainshadows (drought prone areas) and cyclones in the peninsular India. As such, India is a very climate sensitive country. According to the Ministry of Earth Sciences, Government of India, “*Climate change will, in all likelihood, predispose India to enhanced threats from natural hazards linked to the atmosphere and oceans, besides stressing the availability of water and health of our key natural managed ecosystems*”¹. Compared to the 0.74°C increase in the global average surface temperature between 1906-2005, Intergovernmental Panel on Climate Change (IPCC), an analysis of data done by the India Meteorological Department for the period 1901-2009 suggests that annual mean temperature for India, as a whole, has **risen by 0.56°C during the said period.**²

Policy and Executive Measures for Tackling Climate Change

India is a signatory of the United Nations Framework Convention on Climate Change (UNFCCC) and has taken all the necessary policy and other measures to tackle the challenge of climate change along with the member countries in right earnest, as mentioned below.

Green House Gas (GHG) Emission Measurement

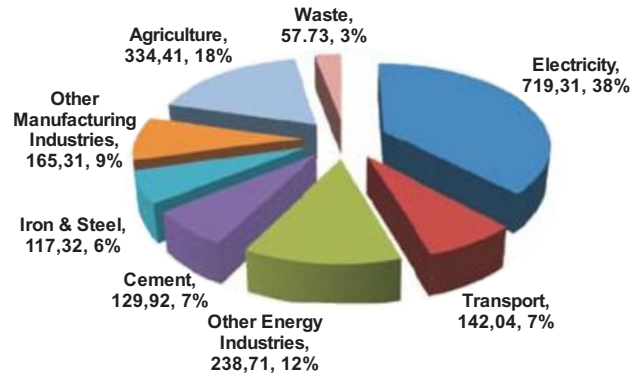
India's first GHG emissions inventory was made in 2004 as a part of its National Communication. India has now proactively estimated its GHG inventory

for the year 2007 in view of the need for GHG emission assessment to be made on a scientific and regular basis. The assessment for 2007 was carried out under the aegis of the Indian Network for Climate Change Assessment (INCCA). The GHG inventory has been prepared by scientists and experts drawn from a network of a diverse mix of institutions across the country having the capacity to generate information on the GHG emission inventories by sources and removals by sinks from Energy, Industry, Agriculture, Land use, Land-use Change and Forestry and Waste sectors on a regular basis. These institutions comprise national research institutions, technical institutions, universities, industry associations, non-Governmental Organizations and the private sector. Other than estimating the GHG inventories, these institutions also collected activity data from relevant sources, and are also involved in the process of generating country specific emission factors. Developing country specific emission factors has been the thrust since the First National Communication process began, especially for the key emitting sources, as it makes the inventory more representative of the circumstances under which the emissions take place and the estimates more scientifically robust³.

GHG Emissions in 2007

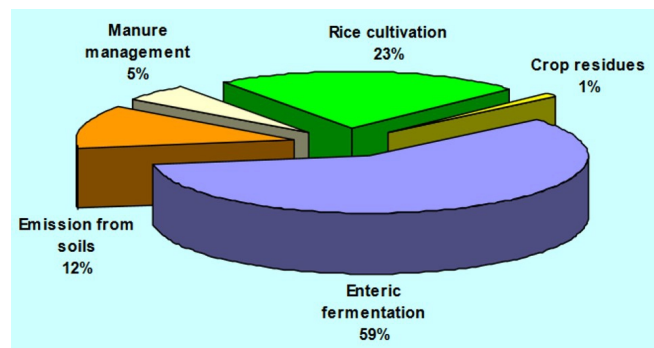
India's GHG emissions are heavily influenced by the structure of its large and expanding economy, the limitations on its energy resources, as also its current status in terms of energy access. In 2007, India's GHG emission by sources and removal by sinks were 1727.71 million tons of CO₂ equivalents (or 1904.73 million tones of CO₂ equivalents without land use, land use change and forestry), with the largest shares from electricity generation (38%), agriculture (18%) and other energy industries (12%)⁴.

Figure 1: Sectorwise Greenhouse Gas Emissions in India.



Reference: Climate Change and 12th Five Year Plan, Planning Commission, Govt. of India.

Figure 2: Sources of Greenhouse Gas Emissions from Indian Agriculture



Reference: Climate Change and 12th Five Year Plan, Planning Commission, Govt. of India. (The document is in public domain).

- The emissions from Indian agriculture are likely to increase significantly in future due to our need to increase food production. The latter would require greater emphasis on application of fertilizers and other inputs. This, in a globally warm environment leads to increased emissions of nitrous oxides and other GHGs. Increased temperatures would lead to higher emissions even at the current level of fertilizer consumption. Despite this, the relative proportion of emissions from agriculture in India is likely to show

Trends of GHG Emission in India

GHG sources and sinks (4)	1990 (tCO ₂ e)	1994 (tCO ₂ e)	2000 (tCO ₂ e)	CAGR, % (1999-2000)
Total emissions	987,885	1,228,539	1,484,622	4.2
Industrial Processes	24,510	102,710	168,378	21.3
Per capita emissions	1.2	1.3	1.5	

CAGR = Compounded Annual Growth Rate

considerable reduction in future because of larger emission growth in other sectors compared to agriculture⁵.

Inventorization of national GHG emissions related to various sectors like energy, industrial processes and product use, agriculture and forestry would help analyze and implement opportunities for reducing the intensity of emissions, including energy management and product use efficiency initiatives. The Industrial Processes and Product Use (IPPU) sector includes GHG emissions produced as a direct by-product of non-energy industrial activities and the emissions involved during the non-energy use of materials which are produced by a process and used as a product in other processes. [In the Second National Communication (2012), Product Use sector is taken along with Industrial Processes sector]⁶.

National Action Plan on Climate Change⁷:

India's first National Action Plan on Climate Change outlining existing and future policies and programmes addressing climate change adaptation and mitigation was released on 30 June, 2008. The Plan identifies core national missions -

1. National Solar Mission.
2. National Mission for Enhanced Energy Efficiency.

3. National Water Mission.
4. National Mission for Sustaining the Himalayan Eco-system.
5. Mission for Green India.
6. National Mission of Sustainable Agriculture
7. National Mission on Strategic Knowledge on Climate Change, India's stance stands justified

Some Self Speaking Facts and India as regards Emissions

- **India's place in historical emissions since 1880 which has resulted in global temperature rise by 0.85° Celsius⁸**

Historical carbon space occupied by various countries in 2009 (1850 as base year):

USA	29%
Other Developed countries	45%
China	10%
Other Emerging Economies	9%
India	3%

Among other things it is clear that among the top emitter nations, India has very low per capita emission.

• **Emissions by Countries (2017)**⁹

Country	Total Emissions in 2017 (billion tons)	Percentage share in Global Emissions (2017)	Co ₂ Emissions per capita (tons/person)
World	37.1	100%	4.8
China	9.8	26.41	7
United States	5.3	14.28	16.2
European Union	3.5	9.43	7
India	2.5	6.7	1.8
Russia	1.7	4.58	11.8
Japan	1.2	3.23	9.5

Circumstances and Challenges before India

Before discussing India's response to climate change (or for that matter of any country's stance) one must consider the fundamental question as to why greenhouse gas emissions take place in the first place. The emissions get generated because of the whole gamut of activities of food production and a host of other activities of industrial production, power production and the ever increasing transportation.

Article 2 of the UNFCCC enjoins the member countries to stabilize the greenhouse gas concentrations with a stipulated conditions that *“Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.”* Precisely for this reason the UNFCCC in its Kyoto Protocol spared the developing countries from binding cuts in emissions because the developing countries are fighting against poverty, hunger, diseases, lack of electricity to millions; as such any binding cut on emissions would adversely affect their struggles for improving quality of life of its citizens. India has in the past taken this stance and there are many supporters for India's stand.

Self - speaking Facts of India's Challenges¹⁰

- India:** 2.4% of world surface area
17.5% of world's human population
17.5% of world's cattle population
- Poverty:** 30% of the population lives in poverty.
- Housing:** 20% of population without proper housing.
- Electricity:** 25% without electricity. Per capita consumption 1/10th of developed world.
- Drinking Water:** 92 million without safe drinking water.
- Human Development Index:** 0.586. Global rank 135

To quote Dr. Robbie Andrew of the Centre for International Climate and Environment Research, Norway, “They (India) have so many things to focus on in that country, to ask them to pull back on emissions is a big problem.” In the UN summit on climate change held in September, 2014 leaders

acknowledged that climate action *should be undertaken within the context of efforts to eradicate extreme poverty and promote sustainable development.*

India's Commitment in 2015 Paris Agreement

India has to take care of its huge population and its need for economic growth in Gross Domestic Product (GDP) terms. Fact is that its emissions may rise further. Therefore India has not committed any peaking or reducing emissions by a particular date. Its declared goal is to adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development. However, it has adopted an innovative approach to the emissions issue by declaring that it will reduce the emissions intensity of its GDP by 33-35% compared with 2005 levels, and that India will create 40% cumulative electricity generation capacity from renewable sources. India further committed that it will create an additional sink of 2.5 to 3 billion tones of CO₂ equivalent through additional forest and tree cover by 2030¹¹.

LED Lighting Bulbs

In India there is a big initiative by the Government of India called Domestic Efficient Lighting Programme (DELP) to change to Light Emitting Diode (LED) lighting system. According to the policy statement declared, India is switching over to LED bulbs by which would result in massive saving of about 100 billion units electricity and Rs.14000 crore per annum.

India Adopting Paperless Electronic Systems

In India much progress has been made and is underway towards reducing use of paper. Elections to the Parliament and the State Legislatures (29) are held every 5 years in India. In the general elections to Parliament 2019, there were 900 million eligible voters. Earlier, ballot papers were in use, which

meant that ballot papers equal to the numbers of eligible voters were required to be printed, bound, transported, voted on and counted. This was gradually replaced by the electronic voting machine from 2004 onwards. In the present system voters just press the button for casting their vote on the electronic machine. This has resulted saving huge amount of paper, and thus correspondingly saving the forests and a valuable contribution to avoiding huge greenhouse gas emissions. This should be counted as a good contribution by India for mitigation of climate change.

Going Demat

Demat, a short form of dematerializing i.e. transforming material (solid) form into virtual form. This is a form of transacting, keeping a record of transaction and its documentation in electronic form only. In order to transact or to access, one goes through internet on his computer to the concerned site. In India, great efforts have been taken to transfer many commercial transactions into demat form. For example, about 18 million people invest or do trading in equity shares and other financial instruments. In the pre-demat form this required huge paper creation, physical handling, persons moving from place to place for the transaction. Use of paper and physical activity has been done away with from around 2000. Trading of equity shares, day in and day out, is done electronically.

References:

1. *Ministry of Earth Sciences, (www.tropmet.res.in/Centre_for_Climate_Change-Research.pdf.*
2. *Indian Meteorological Department. Climate Profile of India. Contribution to the Indian Network of Climate Change Assessment (NATIONAL COMMUNICATION-II) S D Attri and Ajit Tyagi, 2010.*

3. *Climate Change & 12th Five Year Plan. Report of the Sub-Group on Climate Change, Government of India, Planning Commission, (October 2011).* %20Press%20Conference%20INDC%20v5....).
4. *Ibid*
5. *Ibid*
6. *Times of India, Mumbai, 23 January 2016.*
7. *The document of the National Action Plan on Climate Change. Ministry of Environment, Forests and Climate Change.*
8. *India's Intended Nationally Determined Contributions – Towards Climate Justice. 1. Government of India. Ministry of Environment, Forest and Climate Change. (www.moef.gov.in/sites/.../revised%20PPT*
9. *Global Carbon Project. (These figures were presented in the 24th Conference of Parties (UNFCCC) held in December, 2018 in Katowice, Poland).*
10. *India's Intended Nationally Determined Contributions – Towards Climate Justice. 1. Government of India. Ministry of Environment, Forest and Climate Change. (www.moef.gov.in/sites/.../revised%20PPT%20Press%20Conference%20INDC%20v5....).*
11. *Press Information Bureau, Govt. of India. (http://pib.nic.in/newsite/PrintRelease.aspx?relid=128403).*



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The **Regional Centre for Urban & Environmental Studies** is pleased to invite contributions for **Urban World** in the form of articles and research papers from researchers, authors, publishers, academicians, administrative and executive officers, readers and well-wishers on any one the following topics:

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Articles could be between 2000 to 4000 words. They may contain compatible tables, charts, graphs, etc. We reserve the right to edit for sense, style and space.

Contributions may be e-mailed in digital form as a Word file to the Director, RCUES, Mumbai.

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ROUND & ABOUT

World Health Day 2019 (7 April)

The World Health Day is celebrated by the people all across the world every year on 7th of April under the leadership of World Health Organization, to draw the mass people attention towards the importance of global health. This year theme was “Health for All – Everyone, Everywhere” with the focus on providing universal health coverage everywhere and to everyone. Inter alia, it aimed that all people should have access to the quality health services across the globe whenever and wherever they need it.

World Earth Day 2019 (22 April)

World Earth Day is celebrated in more than 193 countries every year on April 22, which marks the anniversary of the Modern Environmental Movement, started in 1970. The 49th World Earth Day was celebrated on 22 April, 2019. World Earth day is celebrated to demonstrate and promote protection of the mother earth and its species and to make Earth a better place for the coming generations. This year the theme was 'Protect our species'.

The Indian Museum of Earth (TIME), India's first earth museum showcasing the country's unique geological history that chronicles rocks, pre-human skulls and dinosaur fossils from 4 billion years ago to recent times, will be set up in the national capital region (location of the museum is yet to be decided). The project is being envisaged as a public-private partnership with significant philanthropic and CSR contributions ahead of the 36th International Geological Congress which is to be hosted by India in March, 2020.

(The Times of India, Mumbai, 5 April, 2019)

Fani Cyclone- Early warning that resulted in minimizing casualties.

Eastern coast of Indian Peninsula is prone cyclones. Odisha State falling at the centre of the coastal line faces the fury most. On 3 May, 2019 the cyclone named Fani ripped through Odisha affecting 1.65 crore people from 18,338 villages of 14 districts, damaging 5.8 lakh houses, destroying trees and crops in 1.8 lakh hectares. As per the final report 64 people are reported to have died. The Super Cyclone of 1999 had claimed about 10,000 lives. It may be noted that the Indian Meteorological Department had given early warning of the cyclone and the administration had evacuated thousands of villages because of which loss of human lives could be minimized. The United Nations agency has appreciated the IMD's action of early warning with “almost pinpoint accuracy” that helped the authorities minimize damage. India's approach to manage extreme weather events was picked up for discussion in Geneva to deliberate upon the best practices of disaster risk reduction.

(Various media reports)

Cities facing increasing level of hazardous particulate matter pollution

Cities are booming with activities and in the rumble the falling state of environment affecting the human life is escaping the attention. To cite an instance the **EnviStats India 2019** report (released on 1 April) along with a large number of parameters, has pointed how the suspended particulate matter (SPM)- a hazardous component of pollution is on the increase in many cities, whereas some cities have managed to contain it. Particulate matter comprises very small particulate matter less than 10 micrometers. Construction activities, unpaved roads and transportation add to them. These are solid particles mixed with droplets of liquids, including metals, dust particles as well as nitrates and sulphates. They are inhaled with our breaths and are harmful to us. A statement from the report is as under:

SUSPENDED PARTICULATE MATTER (Microgram per cubic meter)

	2001	2004	2009	2012	2015	2017
Mumbai	67.2	78	117	117	107	151
Delhi	146	149	252	237	220	241
Kolkata	117	134	126	135	105	120
Chennai	77.6	60	73	57	59	62
Bangaluru	68	69	112	121	119	92

(Portal of the Ministry of Statistics and Program Implementation and The Indian Express, Mumbai, 19 May, 2019)

World Environment Day (5 June)

Celebrated on 5th June every under the auspices of United Nations Environment, the World Environment Day (WED) focuses on environmental concerns ranging from pollution to global warming and sustainable food production to protection of wildlife. Its website is beaming some hard facts, e.g. *“Seven million premature deaths are caused by air pollution each year with about 4 million of these deaths occurring in Asia-Pacific. Nine out of ten people breathe polluted air.* [<https://www.worldenvironmentday.global>]. Started in 1972, this worldwide mega event is hosted by one of the countries. This year it is being hosted by China. The announcement inter alia states that China *“owns half the world's electric vehicles and 99 percent of the world's electric buses. By hosting World Environment Day 2019, the Chinese government will be able to showcase its innovation and progress toward a cleaner environment.”*

(<https://www.unenvironment.org>)

The World Environment Day was celebrated in India with various awareness events. Newspapers carried special supplements/pages for it. Various facts were given out through the reports of pollution control boards and other organizations working in the field of environment protection: A few facts are reproduced here:

Under **the National Electric Mobility Mission** launched in 2013 a target of 1.6 crore hybrid/electric vehicles has been fixed to be achieved by 2020. Till May 2019 only 0.28 million vehicles are on the road i.e. 2% of the 2020 target. Various automobile companies have re-iterated their commitments to reach the target by the due date.

76.8% Indians breathe air worse than recommended air quality standards and 1.7 years would be the increase in average life if India were able to clean its air.

The Central Pollution Control Board uses “chemical oxygen demand” (COD) as a parameter to measure pollution in water bodies. COD level above 250mg/l is considered critically polluted. Nearly 1 in 7 rivers (total 253 rivers) is found to be critically polluted. (Reference: Centre of Science and Environment's State of India's Environment 2019.

(The Times of India, 5 June, 2019)

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