POLICY BRIEF
July 2020

Sustain the Sustainable Change

A policy brief to sustain the benefits of the COVID-19 lockdown on air, water, and noise pollution levels in India

GRIHA

THE ENERGY AND RESOURCES INSTITUTE
Creating Innovative Solutions for a Sustainable Future

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Executive Summary

Rampant pollution, an externality of economic activity, has steadily given rise to a global health crisis of a far greater magnitude than the ongoing COVID-19 pandemic. In 2017, air pollution was responsible for over 1.2 million deaths in India and currently more than 40% of Indians are exposed to five times the safe limit of particulate matter in the air they breathe (Dandona 2019). Despite adoption of mitigation methods, regulation, and campaigns, Indian cities have consistently remained the worst performers in annual listings that evaluate pollution levels (IQ Air 2019). Noise is another major pollutant in cities, with 64% of medical cases that involve hearing loss directly attributable to excessive noise exposure (Mimi Hearing Technologies 2017). According to studies conducted by Indraprastha Institute of Information Technology Delhi (IIIT Delhi), vehicles using horns in unison generate more noise than firecrackers, with decibel levels exceeding 100 dB(A) (Ibrar 2019).

About 600 million Indians are facing high to extreme water stress and about 200 thousand people die every year due to inadequate access to safe water (NITI Aayog 2018). As the population rapidly grows and urbanizes, India's water continues to accumulate toxins. It is estimated that around 70% of surface water in India is unfit for consumption and that every day an additional 40 million litres of sewage enters rivers and other waterbodies with only a tiny fraction having been adequately treated (CPCB 2015).

To combat the growing COVID-19 pandemic, on March 24, 2020, India entered a state of extended nationwide lockdown. This unprecedented event created a unique opportunity to take a closer look at how pollution levels respond to a decrease in economic activities, especially in the industrial, construction, and transportation sectors.

The Central Pollution Control Board (CPCB) reported a drop in air pollution across the country with several major cities witnessing a significant improvement in the Air Quality Index as seen in Figures 1 and 2. Over the Indo-Gangetic plain, the drop in air pollution was clearly visible in satellite feeds, indicating that $PM_{2.5}$ and nitrogen dioxide levels improved by at least 50% relative to average figures recorded during the same period between 2016 and 2019 (Patel 2020a).

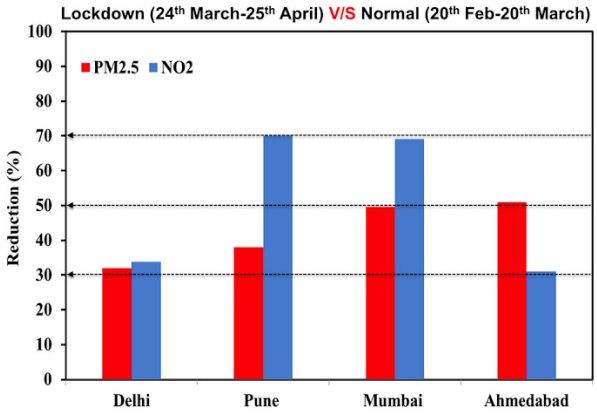

Figure 1 Percentage reduction in air pollution due to lockdown

Source: SAFAR

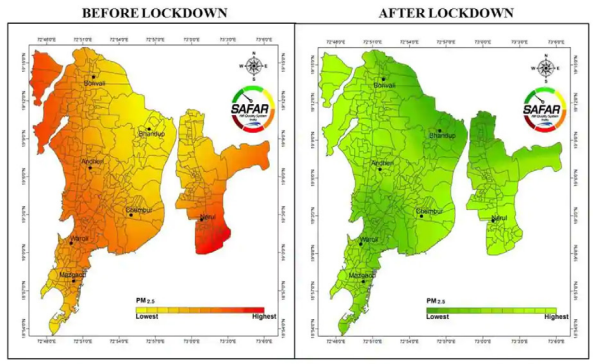

Figure 2 Change in Mumbai's air quality before and after lockdown

Source: SAFAR

Figure 3 Reduction in waste levels in rivers

Source: Indiatimes (2020)

Figure 4 Visibly improved water quality

Source: Planet Custodian (2020)

Rivers recorded marked declines in faecal coliform and biochemical oxygen demand, with visible improvements in water quality noted by casual observers as seen in Figures 3 and 4. Simultaneously, city dwellers across the country reported a significant reduction in noise pollution as vehicles stayed off the roads.

Overall, pollution reduced dramatically as people stayed home during the COVID-19 pandemic. However, as restrictions loosen and regular activity resumes, projections indicate that pollution will not only return, but may intensify as we attempt to make up for the lost time. With India easing out the lockdown and cities witnessing a rise in pollution levels as seen in Figure 5, there arises a pressing need for the introduction of policies that ensure that the present drop in pollution can be sustained. Without such actions, the respite for India is also likely to be temporary. A way forward needs to be charted (Figure 6).

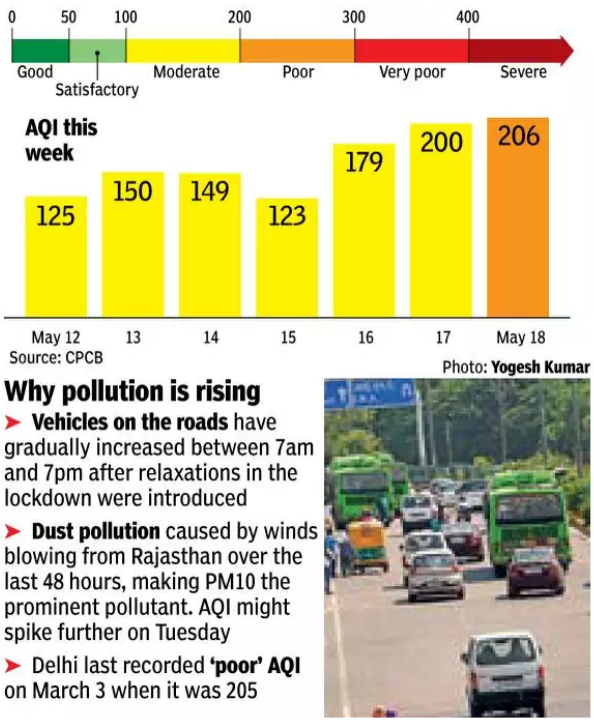

Figure 5 Pollution levels rise as the lockdown is lifted

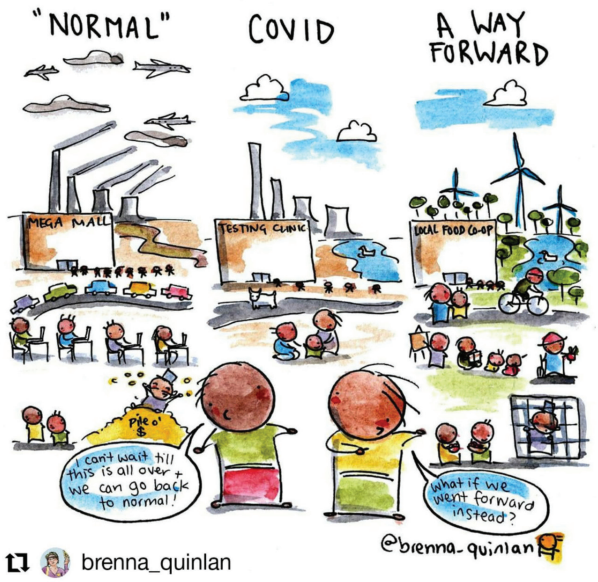

Figure 6 A way forward

Source: Slashers (2020)

GRIHA Council introduces this policy brief with the intent to bolster the expansion of existing policies and propose the implementation of new initiatives that can ensure a reduction in pollution moving forward. Using the empirical data and experience gained during the development of GRIHA's rating systems, the brief identifies potential shortfalls in existing initiatives and puts forward recommendations that are both general and sector specific.

Overview of Pollution in India

Pollution is the contamination of environment by substances that have the potential to harm human life and the natural world, more than their naturally occurring concentrations. Today, pollution has become a global

Figure 7 State of air, water, and noise pollution in India

Source: India.com (2019), Asra (2019), Patrika (n.d.)

concern and has been identified as a major environmental health hazard by agencies such as the World Health Organization (WHO) and governments around the world. The rapid enhancement in developmental activities, urbanization, and industrialization have collectively given rise to a trend of environment pollution by deteriorating air, water, and soil quality, heightened levels of noise, and growing vehicular emissions as seen in Figure 7. The rising pollution is ranked as the sixth most significant global trend and ongoing industrialization of the developing world is a significant contributor to it (Ji 2015). According to a 2013 report by the World Economic Forum, developing countries are poised to suffer the worst effects from climate change and water scarcity. A solution to this emerging crisis requires foresight and dedication towards pursuing alternative paths that are aimed at changing consumption patterns, monitoring emissions, raising awareness, and placing checks on polluting activities.

Air Pollution

Since 1991, India has experienced rapid growth, and in 2005, the country became the fifth largest polluter globally. It has since remained in this position, according to studies conducted by the World Resources Institute and the World Economic Forum (Myers 2020). In 2017, about 1.24 million deaths in India – 12.5% of the total deaths – were attributable to air pollution which included 0.67 million from ambient particulate matter pollution and 0.48 million from household air pollution, which is one of the major risk factors for health issues in India (India State-Level Disease Burden Initiative Air Pollution 2018). With Indian cities recording some of the highest annual average levels of $PM_{2.5}$ as per the WHO Urban Ambient Air Quality Database (2016), and several studies indicating its worsening trend over time, it is safe to assume that rapid urbanization and industrial development have adversely affected the air quality of the Indian cities. There is, however, heterogeneity in the pollution sources and pollutant profiles – vehicular density is vastly different in cities and villages, and diversity in climate patterns and geography across the country causes significant variation in regional and seasonal levels of ambient air pollution. Studies carried out by the Universities of Chicago, Harvard, and Yale estimated that high particulate concentrations are responsible for reduced life expectancy by 3.2 years of over 660 million Indians living in urban conglomerates. The research at the University of California suggests that the adverse impacts of air pollution caused by short-lived climate pollutants may have significantly reduced agricultural productivity in recent decades. The report also

observed that a 10% reduction in particulate emissions by 2030 would save India's $24 billion in health-related costs, and a 30% reduction would save $105 billion. The adverse effects coupled with the fact that the concentration of particulate matter in 180 Indian cities in 2010 was almost six times the standard set by the WHO ensure that the issue of air quality continues to pose a major challenge for the citizens and the Government of India (Greenstone and Pande 2014).

Air Pollution Sources

The primary air pollution sources that were affected by the lockdown are as follows:

- Vehicular pollution which is the largest source of $PM_{2.5}$, NO_x, CO, and HC emissions
- Construction and urban activities that cause rise in PM_{10}, CO, and NO_x
- The industrial sector that emits pollutants, such as PM_{10}, $PM_{2.5}$, SO_2, and CO

As per ARAI and TERI, $PM_{2.5}$ emissions in India are dominated by the industrial (36%) and residential combustion (39%) sectors. Transport contributes to just 4% of $PM_{2.5}$ emissions at the national level; however, these emissions are concentrated in the urban centres. Moreover, being ground-based sources, their contribution to prevailing air quality levels could be much higher. Power plants contribute 4% of $PM_{2.5}$ emissions, however, these may contribute significantly to the pollution levels in the specific zones of influence of the power plants. The 2011 inventories of NO_x emissions in India show dominance of the transport sector (35%), power plants (22%), and agricultural pump sets (15%). The SO_2 emissions are estimated to be generated mainly by the industry (49%) and power sector (43%) (ARAI and TERI 2018).

Water Pollution

Water pollution is a major problem in India as almost 70% of its surface water and a growing percentage of its groundwater reserves have been contaminated with toxins (Murty and Kuma 2011). In many cases, these sources have been rendered unsafe for use, creating water scarcity for both people and ecosystems. A study conducted by the CPCB identified severely polluted stretches on 18 major rivers in India. Unsurprisingly, most of these stretches were in and around large urban areas. In addition to rapidly depleting groundwater reserves, the country faces the challenge of groundwater contamination – geogenic contaminants such as salt, iron, fluoride, and arsenic have affected groundwater in over 200 districts spread across 19 states. Being an environmental resource, water is regenerative in the sense that it has the potential to dilute pollution up to a certain limit, but the current loads of pollution far exceed the natural regenerative capacity of the hydrologic system. For a populous and developing country like India, the impact is compounded into an estimated loss of almost a third of the GDP growth. The cost of environmental degradation in India is estimated to be $80 billion a year, with health costs related to water pollution alone estimated at about $6.7–8.7 billion (World Bank 2013), associated mostly with diarrheal mortality and morbidity of children less than 5 years of age. In addition to the economic losses, a lack of access to clean water, sanitation, and hygiene results in the loss of 400,000 lives each year across the country (World Bank 2011).

Water Pollution Sources

- Untreated and/or inadequately treated effluent discharge in rivers and streams by industries

This primary source of water pollution was drastically reduced in the lockdown period in India. Water pollution from this source can be segregated as pathogenic/bacteriological pollution, oxygen-depleting organic pollution, and toxicity due to excess of nitrate/fluoride/arsenic/iron content.

Noise Pollution

Noise is regarded as a pollutant under the Prevention and Control of Pollution Act of 1981. It has been defined as any unwanted, unpleasant, obtrusive, annoying, distracting, or persistent sound that interferes with sleep, concentration, and overall health. The WHO guidelines for community noise recommend less than 30 A-weighted decibels [dB(A)] in bedrooms at night for quality sleep, and less than 35 dB(A) in classrooms to ensure optimal conditions for learning. Noise is often an underestimated threat that can cause several short- and long-term health

problems. It is increasingly being identified as a potential hazard to physical and psychological well-being; excessive noise can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance, and provoke annoyance responses and changes in social behaviour.

There are two major settings in which noise pollution occurs – community noise and industrial noise. The sources of community noise can be diverse, ranging from automobiles and construction work to loudspeakers and fireworks. Several studies have been conducted in various parts of the country to assess ambient noise levels, and results show that most of the total environmental noise can be attributed to motor vehicles. Daytime noise levels measured along the roads between two campuses of a university in Balasore, Odisha, ranged from 70.1 dB(A) to 120.4 dB(A), which are above the permissible limits for road traffic noise (i.e. 70 dB[A]) (Jamir 2014). Noise generated by different vehicles was also measured, and none of the emissions were within the permissible limits for road traffic. Vehicular air horns and their misuse have been reported as the major contributor to consistently high noise pollution levels.

In the study shown in Figure 8, which measured noise levels in four zones as categorized by the CPCB, the highest average daytime noise levels were detected in silence zones (73.53 dB[A]) – within a hundred metre radius around hospitals, educational institutions, courts, and religious places. The lowest noise levels were recorded in residential areas [63.5 dB(A)]. The highest average

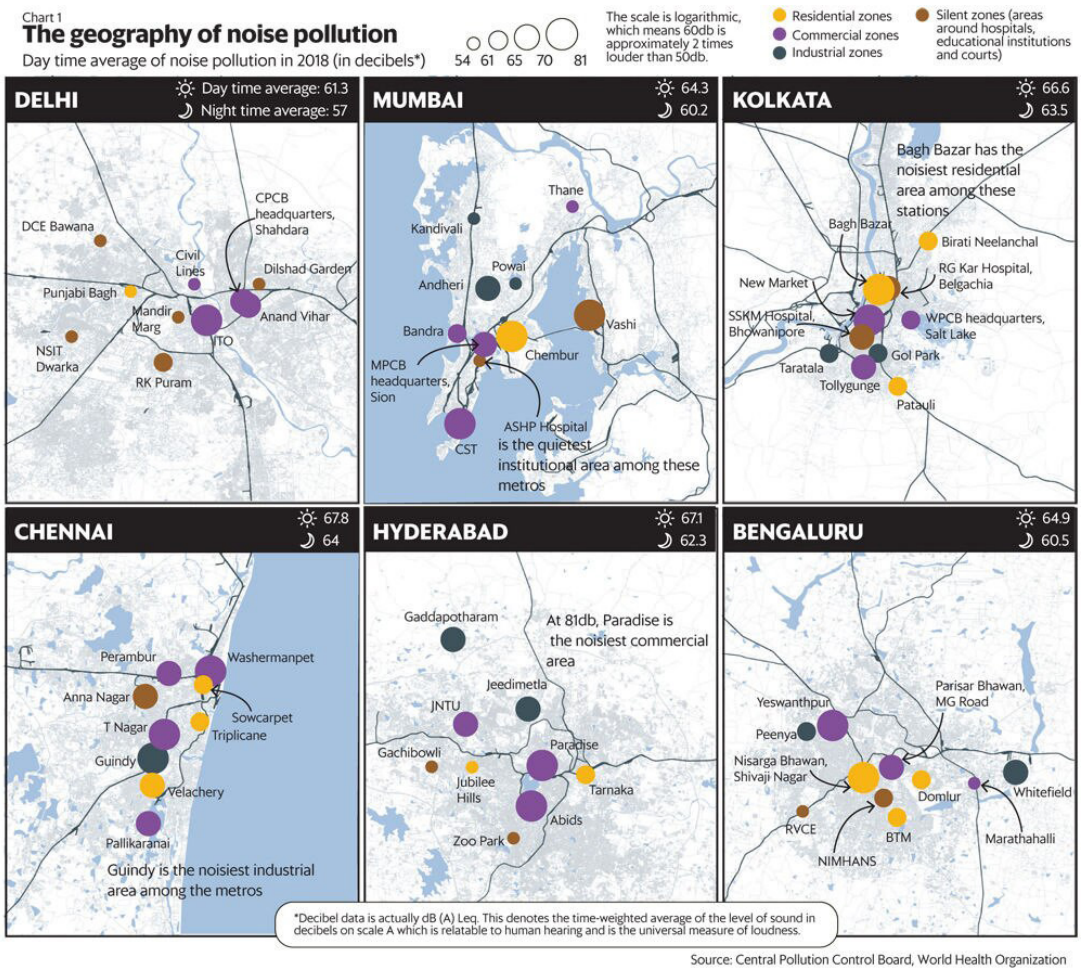

Figure 8 Daytime average of noise pollution levels in 2018 w.r.t the zones

noise levels during nighttime were at traffic intersections [71.18 dB(A)] and the lowest were recorded in industrial areas (Garg 2017). In addition to the continuous traffic noise, festivities, public address systems, and noise from machines at construction sites adversely affect the quality of life. According to a study conducted in a residential area in Delhi during the festival of Diwali, the average ambient noise levels ranged from 76 to 80 dB(A) – , i.e. 1.2 to 1.3 times higher than on normal days in the area [57–69 dB(A)] (Gupta 2012). Intense high impact noise emitted by fireworks poses great risk and can result in significant damage to the auditory apparatus. Constantly noisy neighbourhoods can also give rise to an atmosphere of irritability and hostility.

The WHO has correlated critical health effects with corresponding noise levels and exposure time in specific environmental settings – ill effects include auditory disorders such as hearing impairment, tinnitus, earache, noise-induced hearing loss, and non-auditory manifestations, such as headache, psychological disturbances manifested by irritability, inability to concentrate, reduced efficiency, sleep disturbance, and interference with speech. The significant hearing impairment occurs on prolonged exposure to noise levels above 70–85 dB. According to the Global Burden of Disease Report 2004, published by WHO, the global prevalence of moderate to severe hearing loss (41 decibels or greater) was 278 million, and mild hearing loss (26–40 decibels) was 306 million. In India, the prevalence of hearing loss was estimated to be 63 million (6.3%) (WHO 2004).

Noise Pollution Sources

- Vehicular machinery and misuse of horns
- Construction equipment and related activities
- Industrial machinery and related activities
- Socio-cultural elements, such as loudspeakers, music instruments, and firecrackers

Moving Forward

India provides a compelling setting to explore the efficacy of policies aimed at addressing the issue of pollution for multiple reasons, foremost among them is the fact that the people of India account for nearly 17% of the global population and that the country has experienced rapid economic growth of about 6.4% annually in the last two decades. Both these factors have placed steadily increasing pressure on India's natural environment and, as a consequence, the country is grappling with the issue of pollution at an unparalleled scale. In terms of air pollution alone, India is home to 21 of the 30 most polluted cities in the world. The need has never been greater to rapidly enact evidence-based policy interventions aimed at containing the crisis before it reaches irreversible proportions and causes irreparable loss. While India already has policies in place to address the issue of pollution, GRIHA has identified possibilities that augment the impacts of the policies and could potentially ensure that pollution does not rebound in the aftermath of the COVID-19 pandemic.

Existing National Acts, Standards, and Policies

Since the mid-1970s, India has understood and acknowledged the problem of pollution. Incidents such as the Bhopal gas tragedy triggered the Government of India to enact the Environment (Protection) Act (EPA) of 1986. In 1985, the central government created the Ministry of Environment and Forests as the administrative organization in India for regulating and ensuring environmental protection. The national acts and standards of India play an important part in regulating environmental quality and are listed in Table 1 in the annexures.

Apart from formulating active laws, numerous policies for the betterment of environment were initiated in the country. Launched at national and regional levels, these policies covered the facets of monitoring, assessment, mitigation, prohibition, and awareness generation. Some of these policies pertinent to air, noise, and water pollution are discussed in Table 2 (in descending order of its initiation) in the annexures.

Discussion on the current policies in India

As is evident from Table 2, there are now robust initiatives to monitor real-time changes in air, water, and noise quality, spread awareness, explore alternative energy

sources, and even place a cap on maximum permissible pollution by allowing trade in emissions.

However, a definitive solution to the problem is still awaited – a study conducted by International Institute for Applied Systems Analysis (IIASA) and Council on Energy, Environment and Water (CEEW) in New Delhi predicts that only about 833 million citizens would be living in areas that meet the National Ambient Air Quality Standards by 2030. This means that over 674 million others would still be breathing toxic air, even if the country were to comply completely with its existing pollution control policies and regulations (CEEW-IIASA 2019). Given the magnitude of the problem and millions of lives it has the potential to affect, it is essential that existing policies be strengthened and new ones introduced before feedback loops and runaway effects compound the issue of air, water, and noise pollution to insurmountable proportions.

Policy Recommendations

The key recommendations of this policy brief are aimed at reducing air, water, and noise pollution levels in the country. Table 3 lists these recommendations and displays the pollution typology and sectors, to which they pertain. The recommendations address only the sources affected during the COVID-19 lockdown for air, water, and noise, which can be broadly categorized as follows:

Table 3: Policy recommendations

S. No.	Policy Recommendations	Air Pollution			Noise Pollution			Water Pollution	
1	Real-time mapping of pollution levels	✓	✓	✓	✓	✓	✓	✓	✓
2	Map for collective impact of all sources	✓		✓	✓		✓	✓	
3	Pollution abatement technology	✓	✓	✓	✓	✓	✓	✓	✓
4	Emission trading scheme	✓						✓	
5	Ban on energy production from coal	✓							
6	Transit bypass			✓			✓		
7	Installation of new sewage treatment plants and regular operations and maintenance of all							✓	✓
8	Dual distribution system							✓	✓
9	Water pricing							✓	✓
10	Eco-friendly alternatives in detergents							✓	✓
11	Recycled water/vacuum-based street cleaning		✓						
12	Compliance with GRIHA CITIES/ GRIHA LD/GRIHA	✓	✓	✓	✓	✓	✓	✓	✓

LEGEND : Industrial Construction & urban activities Transportation

While Table 3 summarizes the key policies of this brief, the following is a list of general recommendations that will facilitate comprehensive application of the specific recommendations and complement and support their enactment:

1. Propose stringent punishment for pollution at source exceeding set limits, such as temporary suspension of operations or monetary fines.
2. Set up public feedback forums and establish fast track resolution services.
3. Increase employment in the pollution board to have adequate manpower to execute, monitor, and enforce the initiatives taken up by the government.
4. Develop educational materials and compliance assistance tools for the regulated community, especially small businesses, and distribute the materials to all regulated sources.

Figure 9 depicts the efforts required to implement the policy recommendations and the impact of each proposed policy, plotted in relativity with each other, for the ease of understanding and decision making. From the figure, we can infer that from among the recommended policies, the use of pollution abatement technology or eco-friendly alternatives in detergents requires lower effort and has a higher impact.

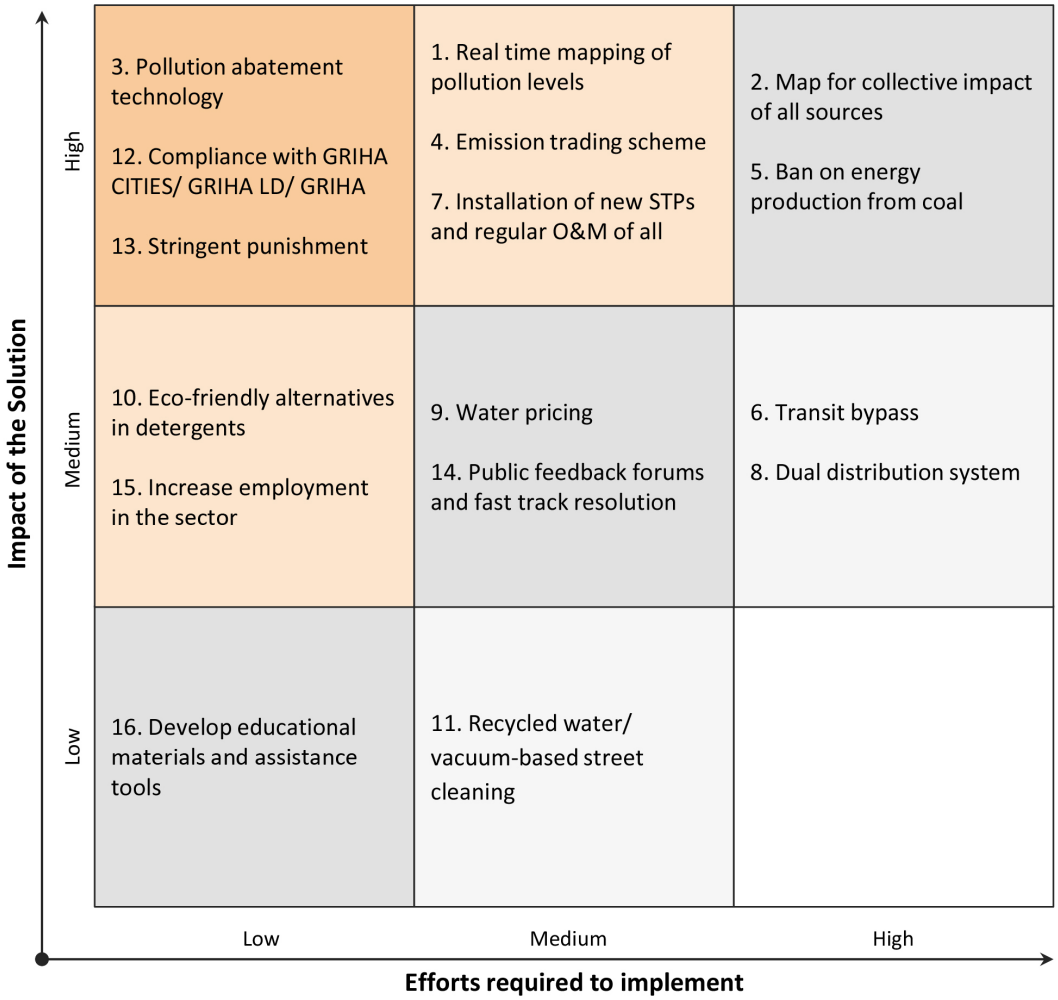

Figure 9 Efforts required for implementation v/s impact of the solution

Detailed Policy Recommendations

1. REAL-TIME MAPPING OF POLLUTION LEVELS

The policy brief recommends the implementation of real-time mapping of environmental pollution levels by using real-time air/noise/water monitoring metres, such as the Continuous Ambient Air Quality Monitoring System (CAAQMS), the Continuous Emission Monitoring System (CEMS), the Continuous Effluent Quality Monitoring System (CEQMS), and the real-time noise monitoring terminal. An immediate fulfilment of the same is recommended for all industries identified to have a high polluting potential and a medium polluting potential, irrespective of their size of infrastructure and scale of operations.

India, in 2014, initiated the installation of CEMS and CEQMS in 17 categories of highly polluting industries and common pollution treatment facilities. In addition, GPIs (grossly polluting industries) located in the Ganga basin are also required to install CEQMS for monitoring and reporting of effluent quality on real-time basis, while CAAQMS had to be installed both by the government and by the industries to monitor ambient air quality in the respective regions (Centre for Science and Environment 2018). However, while Maharashtra's state pollution control board identified 23,500 industries with 'high pollution potential' and 25,500 industries with 'medium pollution potential', only 595 units were targeted in the state, of which 431 have installed CEMS. As informed by the government in February 2020, as many as 732, or 18%, of the highly polluting industries in India that were required to install CEMS, have not complied (The Wire 2020).

This policy not only fulfils the need to map a larger pool of industrial polluters, but by replacing static data with real-time data, this policy suggests to improve data accuracy, facilitate single point calibration, reduce duration of information dissemination, and improve ease of monitoring. Real-time mapping will ensure fast data analytics and immediate action to avoid critical situations. GRIHA also advocates for all data to be made available to the public and strict action to be taken against non-compliers, either by imposing higher monetary fines or by temporary suspension of their operations.

This policy can be further extended into the transport and construction sectors as well. All projects that require an environmental clearance may be brought under the purview of this policy while road junctions identified for their high noise and air pollution levels may also be monitored.

2. MAP FOR COLLECTIVE IMPACT OF ALL SOURCES

Micro, Small, and Medium Enterprises (MSMEs) are largely excluded from monitoring for pollution, as are large-scale industries that are not categorized as highly polluting. These industries are neither accounted for pollution measuring scheme nor are they penalized. However, even though their individual investments and impacts are low, they have both the potential to pollute through aggregated emissions and to prevent pollution through pooled resources. Even the Sustainable Development Goals (SDGs) recognize that the impact assessment needs to evolve so that neutral or beneficial effects are harnessed even where collective effects exceed sustainability limits.

It was collective action as well as joint abatement using a common effluent treatment plant that enabled 250 small-scale industries at Nandesari, Gujarat to efficiently comply with the State Pollution Control Board (SPCB) norms in 2009, which had not been possible for the factories on an independent basis for the last 20 years (Mishra 2009).

GRIHA, thus, proposes the mapping of low-impact industries and industries of all scales to ensure that collective pollution is accounted for. Apart from monitoring, these industries can be encouraged to adopt green technology and provided with procedural and/or financial incentives so that they reduce their emissions and effluent release. MSMEs in industrial areas can be provided with collaborative solutions to reduce their combined impact on environment. This policy brief thus emphasizes on existing monitoring and mitigation programmes to be augmented to account for these undocumented industries and provide for their impact as well.

3. POLLUTION ABATEMENT TECHNOLOGY

Some commonly used technologies to reduce pollution and its impact on the environment are air scrubbers, noise mufflers, numerous treatment systems, and even

filters. Many more such technologies are available and in use today. This policy suggests promoting the use of pollution abatement technology by stressing on the need for financial and technological incentives. The creation of financial subsidies to enable all members of the polluting sectors to install pollution abatement technology on an urgent basis is also suggested. Similar financial incentives should be provided to researchers for developing new devices. For ensuring the use of clean technology and minimizing the impact further, devices which use clean energy and are locally produced should be incentivized. This strategy is applicable to the three sources of pollution – air, noise, and water – and should be implemented in all the polluting sectors.

The pollution abatement technology is currently available in two forms – for cessation of pollution at source and cessation of pollution within a predefined radius. For mitigation at source, existing polluting machinery may be replaced with newer cleaner technologies or retrofitted for reduced pollution generation. The primary benefit of point mitigation is that pollution is arrested at source, preventing unchecked dissipation of pollutants into the environment. However, in the case of small-scale sectors, this method may prove to be financially demanding and cumbersome. Therefore, if an entity is unable to implement point source reduction in pollution, a radius-based strategy can be implemented or a retrofittable and integrated solution should be provided.

It is to be noted that the noise standards for vehicles and machinery permit higher levels of sound produced as compared to the limits set for a city's ambient noise. While even independently, these sources generate sound levels higher than the desired ambient sound and the collective impact can have serious health implications. However, with the use of sound diffusers, this collective noise can be dissipated within a permitted radius and the ambient levels can be met.

Radius-based mitigation is, thus, a strategy where pollution abatement systems and technologies are used to ensure that pollution is mitigated within a predefined radius. Some examples of this are the use of sound barriers along noisy roads or construction sites or the creation of a green buffer around the industrial sectors to check air pollution.

4. EMISSION TRADING SCHEME

Under this policy, GRIHA proposes the adoption of a cap-and-trade Emission Trading Scheme (ETS) for industries of all the states. In such a programme, a cap, that is, a pollution target for an area for a year, is set based on ambient air quality standards. A fixed number of permits are issued to all industries/companies appropriated as per their category and scale of operations. The industries can only emit as much as the permits they own provide for.

An ETS makes companies liable for their emissions. By putting a price on emissions, industries are forced to bear the cost of the emissions associated with what they produce and consume, and it influences them to choose lower emission options. With trading as an expensive option and a cap to the maximum permit a single industry may have, industries unable to amass permits will invest in the abatement technology and pollution release will thus be controlled collectively. Restricting the number of permits available overall will control the total emission permitted in each state (Leining 2019). Thus, a well-designed, fair-priced, and transparent scheme can deliver substantial environmental benefits. It encourages the use of cost-effective abatement technology, low-impact development, and even innovation in the industrial sector. Furthermore, the ETS generates revenue for the government, produces emission data, and allows for information sharing. It can be linked with other schemes as well (Bandyopadhyay 2016).

In January 2019, Gujarat initiated a pilot cap-and-trade programme targeting PM pollutants and launched it on September 15, 2019 for 155 industries situated in the highly polluted Pandesara area in Surat. The scheme is monitored real time using the CEMS. In a month since, trading has been done 386 times and the emission cap per unit fixed at 280 tonnes in a month has not been breached. The total emission recorded was 245 tonnes and the Gujarat Pollution Control Board further reduced the cap to 200 tonnes for the second month. Before this pilot programme, 155 units in the area were emitting 362 tonnes of emissions per month (Bhatt and Dave 2019). The European Union's Emissions Trading System has also been effective in mitigating global warming with capped emissions in 2016 being 26% lower than in 2005, when the scheme was first launched (CNBC, Aggarwal 2019).

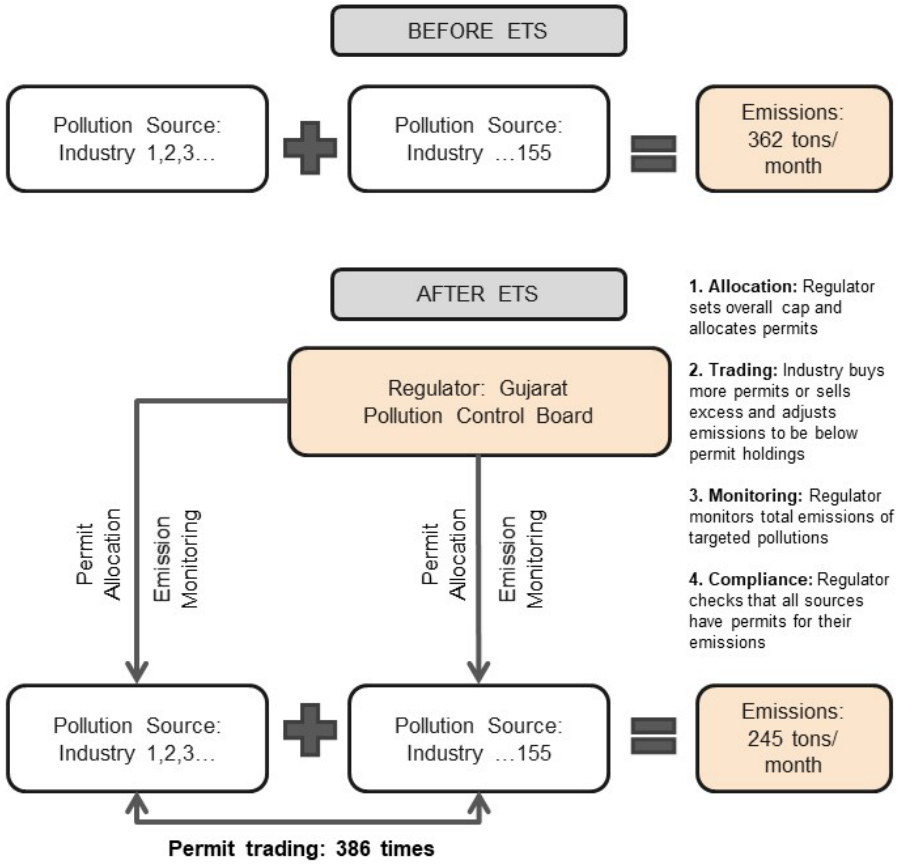

Figure 10 Functioning of the emission trading system

Source: After Duflo, Greenstone, Pande, et al. (2010)

5. BAN ON ENERGY PRODUCTION FROM COAL

The cleaner environment noted during the lockdown period was due to the complete stoppage of all the activities including transport, industrial, construction, etc. In other words, a massive scale of measures was responsible for the improvement noticed in the pollution levels during the lockdown period. Similarly, to provide such an improvement, this prohibitory policy suggested by GRIHA shall be a drastic and dual-intentioned measure. The first impact the policy hopes to attain is lowering of pollution caused by the use of coal for energy generation. The second is to promote the generation of energy from clean fuels and/or renewable sources.

Joining the likes of Canada, Germany, and the UK, on February 27, 2019, Finland became the most recent addition to the list of the countries that have initiated the gradual phase out of the use of fossil fuels in energy production and are moving towards an emission-free energy system. The use of coal as a fuel for the production of electricity or heat will be prohibited from May 1, 2029 in the country, while laws promoting the use of biofuels in transport and the use of biofuel oil for heating and work machines will also be proposed (Finnish Ministry of Employment and the Economy 2019). In the UK, in line with the 2024 deadline, the use of fossil fuels in power generation from 2012 to 2019 decreased by more than 80%. Other European countries, such as Austria and Hungary, have also made official commitments in this regard, while Belgium is already coal-free since 2016. Coinciding with its coal phase-out plans, a Canadian energy policy also includes plans to ensure 90% of the nation's electricity comes from sustainable sources by

2030 – up from 80% in November 2016 (NS Energy 2020).

Meanwhile in India, according to BP Energy Outlook 2019, coal's share in the country's primary energy consumption is on track and to decline from 56% in 2017 to 48% in 2040. But that is still nearly half of the total energy mix and way ahead of any other source of energy despite the contribution of renewables expected to rise fivefold to 16%. Even the NITI Aayog in a 2017 report estimated

as lower taxation, increased investment, reduced cost of use among others, so as to gradually shift the country's dependency to clean energy from coal.

6. TRANSIT BYPASS

The unwanted effects of transport operations are causing environmental as well as health degradation. For example, community noise, including traffic noise, is already recognized as a serious public health problem

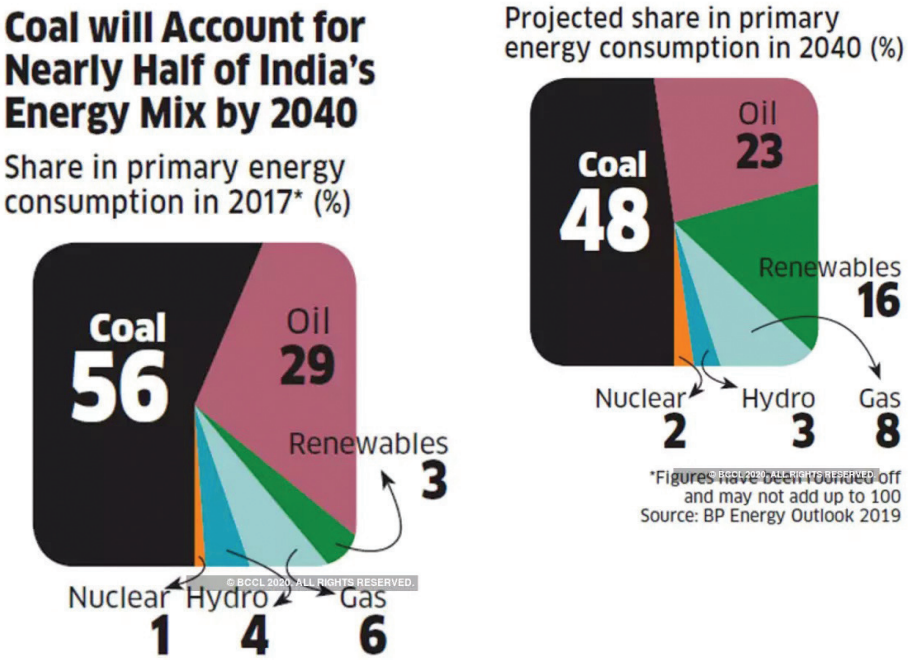

Figure 11 Coal will still account for nearly half of India's energy production in 2040

Source: Bharat Coking Coal Limited (2020)

the share of coal in the energy mix in 2040 to be 44% (Seetharaman 2019).

In order to prevent this projected scenario and expedite our country's progress towards coal-free energy production, this policy must be mandated on an urgent basis. Apart from instituting a prohibition on setting up of new coal-based energy manufacturing plants, a plan for compensation and a term plan preparing for the ban must be made. The policy brief proposes simultaneous efforts to be made in the clean energy production sector, with an increase in employment and financial incentives, such

by the WHO. Traffic noise has a variety of adverse impacts on human health. Noise-induced health effects include disturbance in sleep, activities, performance and concentration, annoyance and stress, biological risk factors, cardiovascular diseases, and psychiatric disorders. It also influences the natural environment by scaring and disorientating animals and birds and interrupting natural biological processes. Noise reduction, as well as exhaust emission control, is one of the fundamental trends towards the cleaner, safer, and more user-friendly transport (Jacyna, Wasiak, Lewczuk, *et al*. 2017).

This policy also focuses on the creation of a transit bypass system around all 29 Tier 1 and Tier 2 cities in India with the intention of reducing thoroughfare, especially by heavy duty vehicles. This will help in reducing air, dust, and noise pollution in urban areas which is caused by unnecessary movement of transit vehicles within cities. Similarly, within cities, the existence of ring roads will redistribute routes and improve the environmental conditions of the congested city centres. Also, the cores of the cities that suffer the most from vehicular pollution will be protected from thoroughfare and occupants will be provided respite.

7. INSTALLATION OF NEW SEWAGE TREATMENT PLANTS AND REGULAR O&M OF ALL

An estimated 62,000 million litres per day (MLD) of sewage is generated in urban areas in India, while the treatment capacity across the country is only 23,277 MLD, which is just 37% of the sewage generated, according to the data released by the government in December 2015. Further parsing of these data reveals that of 816 municipal sewage treatment plants (STPs) listed across India, only 522 work. So, of 62,000 MLD, the listed capacity is 23,277 MLD but not more than 18,883 MLD of sewage is actually treated. That means 70% of the sewage generated in urban India is not treated. According to the CPCB, of the total STPs in India, 79 do not work, 145 are under construction, and 70 are proposed (Mallapur 2016). The operation and maintenance of existing treatment capacity is way below, with 39% plants not conforming to the environmental rules for discharge into streams (CPCB 2009).

Therefore, it is recommended to install new STPs and regularly carry out operation and maintenance of the existing STPs installed to enhance their efficiency and to treat maximum water from cities and industries before discharging into the waterbodies. At locations where there is no sewerage network, Decentralized Wastewater Treatment Technologies (DWTT) need to be implemented. The key focus should be on creating a small footprint, ensuring high resource and energy efficiency, and generation of a good quality of treated water for optimum reuse.

8. DUAL DISTRIBUTION SYSTEM

Globally, natural water reserves are being tremendously stressed due to changing climate patterns and soaring population. The already grave situation has escalated as pollutants from different sectors are dumped into these natural reserves leading to the contamination of whatever little fresh water is available with us. Therefore, to minimize the ever-growing burden on such water reserves it is wise to fulfil the potable water demand from the treated wastewater. This fetches the dual purpose of diverting pollutants from entering the water sources and treating the wastewater to be reused for different purposes.

The treated water from the centralized wastewater treatment plants could be supplied to different sectors, including residential, for all purposes except for cooking and drinking to encourage the concept of reuse. Singapore is a perfect example that is mitigating a part of its water stress through reuse of wastewater to meet 55% of its total water demand (SNWA n.d.).

In India, the commonly found water delivery system is a single distribution system. The drawback of being a single line is that it can provide only one quality of water, that is, potable water. The absence of a secondary line dissuades the reuse of non-potable water, such as treated wastewater. As a result, water even after treatment is dumped into waterbodies, negating the purpose of treatment. To avoid this wastage and to promote the reuse of water, this policy emphasizes the need for a dual distribution system to be installed at the city, neighbourhood, and independent building levels. A dual distribution system involves the use of water supplies from two different sources in two separate distribution networks. The two systems work independently of each other within the same service area. Installing a dual distribution system will maximize the use of treated wastewater. The treated water can be bought back by industries from the treatment plants, thus completing the water cycle. This can replace dependency on potable water for purposes such as gardening, washing cars, flushing at a small scale, street washing, irrigation, and firefighting at the city level.

9. WATER PRICING

India faces a serious and persistent water crisis owing to a growing imbalance of supply and demand, as well as

poor water resource management and climate change. India is projected to face severe water stress by 2050 (OECD 2014). The policy for water pricing intends to instil value for accessibility to clean water and promote conservation practices by reducing exploitation and contamination of the water resources.

Poor cost recovery has rendered most of the water utilized in the country as financially unsustainable. One of the reasons for such a scenario is that the water utilized in India is not operated independently and not managed on principle of accountability and transparency and is loosely regulated. An equally important factor is the price for water that is not determined based on the economic principles involving cost involved in producing and delivering water, rather it is based on socio-political considerations. Therefore, revenue from the tariff is inadequate to contribute to new capital investments. Hence, there arises a need to review the existing practices to determine the water tariffs and come out with ways to incorporate the economic principles of pricing in the process (The Energy and Resources Institute 2010).

The tariff structure used in urban water supply also varies across states like the institutions involved in its provision. A 'tariff structure' is a set of procedural rules used to determine the conditions of service and monthly bills for water users in various classes or categories. The water charges could be in the form of non-volumetric flat rate tariff, non-volumetric water tax, uniform metered tariff, metered block tariffs, or a combination of above.

One very effective way of setting the protocol is establishing an independent regulatory body which ensures efficiency and transparency in the tariff setting process. The tariff philosophy should be based on the economic principle of pricing, namely revenue sufficiency, economic efficiency, equity, and fairness. The tariff structure consisting of demand charge and variable charge, like in the electricity sector, is recommended. The O&M cost (including manpower cost, power cost, bulk water rates, chemical/treatment cost, repair and maintenance cost, etc.) and capital recovery cost (including interest cost, depreciation, and reasonable return) are recommended to be included in the cost component while determining user charges.

10. ECO-FRIENDLY ALTERNATIVES IN DETERGENTS

Conventional detergents consist of chemicals in a large quantity, of which 30%–40% content is of phosphates (WWF 2011). Phosphates are used in detergents to enhance their cleaning performance. But on the downside, they contribute to algae growth in our waters, consuming large portions of oxygen and causing severe stress to living water organisms, such as fish, plants, and other aquatic life. As per the data by the World Wildlife Fund (WWF), 1 kg phosphate can produce up to 500 kg algae. They are one of the main causes of eutrophication. The WWF has been campaigning since 2007 to ban phosphates in laundry and dishwasher detergents, and considering the same, the use of phosphates has been banned in many countries.

Phosphates in detergent products in India is about 2.88 M tonnes/year, higher than prescribed by the regulatory bodies (Patel 2020b). Therefore, this policy suggests encouraging the use of eco-friendly alternatives to phosphate in detergents or the use of alternatives that pose a lesser detrimental impact on the environment. This can help in moving one step closer to mitigating water pollution in the country. A few of the alternatives could be the use of soap nuts, shikakai, baking soda, and lime.

11. RECYCLED WATER/VACUUM-BASED STREET CLEANING

Street-borne pollutants are a source of water- and air-quality degradation in urban areas, as they include some of the metals and petroleum by-products associated with vehicles and road surface sediments. Talking about road dust, it is one of the contributors to PM_{10} levels in urban areas. The friction of tyres moving on dirt covered roads causes the dust to become airborne and classify as an air pollutant. The current commonly used method of subduing this dust is by manual sweeping. This policy thus brings forth an alternative method of reducing road dust pollution, that is, the use of vacuum-based street cleaning and/or wet street cleaning using recycled water, which is being practised in other parts of the globe.

This policy can be mandated for select areas (around construction sites, open grounds) that contribute heavily to road dust pollution. As road dust pollution is a dry season problem, this policy may be implemented

seasonally in the rest of the urban areas. Vacuum-based street cleaning has the advantage that it collects and takes away residue from the streets, thus, not only reducing dust-based pollution but also the probability of the adjoining water resources getting polluted by the road surface contaminants. The results of the research studying the impact of the road dust emissions on air quality, and, in particular, the results of the research on the impact of various street cleaning technologies on the PM_{10} concentration levels are extremely divergent, and in some cases even contradictory. Researchers have not yet been able to clearly ascertain the scale of the decrease/increase in the PM_{10} concentration in the air due to the automatic cleaning and washing of the streets (Bogacki, Mazur, Oleniacz, *et al*. 2018). In a study by Yee (2005), the improvement was attributed to sweeping/washing operations which produced efficiencies of up to 30% and 24%, respectively. However, these benefits were short-lived, lasting no more than 3–4 hours for total suspended particulate (TSP) and 2–3 hours for PM_{10}. However, given that sweeping is considered as a best management practice in developing a strategy to control nonpoint source pollution by Environmental Protection Agency, it has been included as a recommendation in this policy brief.

12. COMPLIANCE WITH GRIHA CITIES/GRIHA LD/GRIHA

The current construction practices in India have an immensely detrimental impact on the environment. The construction activities are responsible for 23% of air pollution in cities, 50% of climate change due to gaseous emissions, 40% of contamination of potable water, 50% of pollution due to the dumping of waste in landfills, and 50% of ozone-depleting processes (Brandt-Williams 2002).

In response, the GRIHA rating systems enlist various strategies and also include pollution mitigation strategies as a part of their compliance.The GRIHA rating has been devised in such a manner that we have a criterion to evaluate the construction practices and measure reduction in harmful emissions, dust generation, contamination and wastage of water, loss of vegetation, loss of fertile soil, and generation of construction waste. Air pollution control through barricading, wheel washing, covering of particulate materials amongst others is appraised in this criterion. Thus, this policy is an advice to link the current policies with the GRIHA criteria and ensure efficient and low impact practices that use resources judiciously, and lower pollution generated on site due to building activity. Apart from this section, the chief aim of this rating system is to reduce air, water, and noise pollution caused by the lifecycle of the buildings.

Similarly, GRIHA for CITIES rating system developed for CIvic bodies governing Towns, Industries, Existing and new Settlements addresses pollution as an environmental issue among other variables. There is a need to move away from conventional vehicles and adopt low-carbon interventions to reduce vehicular pollution. This can be done by the use of alternative transport systems, such as the E-vehicles, non-motorized transport facilities, that is, walking or cycling, and the use of public transport facilities or even by the upgradation of conventional means to use clean fuel. The criterion also describes that for a shift in people's preference, supporting provisions need to be made, such as ensuring safety on roads, building dedicated cycle tracks, and devising bike-sharing schemes. For a sustained compliance with the criterion, agelity tests of ageing vehicles are suggested, and to reduce crowding, congestion pricing schemes and/or park and ride schemes may be initiated.

This policy thus calls for a compliance of the state with relevant criteria from the GRIHA, GRIHA LD (Large Developments), and GRIHA CITIES manuals. By adopting these comprehensive set of strategies, the city will not only benefit from a reduction in pollution but also move towards a low carbon infrastructure and development in the long run. An extension of this policy would be to comply with the GRIHA rating system in totality to ensure that all development is holistically sustainable.

Way Forward

While there are numerous news reports, studies by reputed research organizations, social media coverages, and documentaries that highlight the gravity of the problem of pollution in India, a national lockdown was required to display a contrasting outlook. This eye-opener reinstated peoples' resolve to tackle pollution in India. The aforementioned policy statements were drafted to expedite translation of this resolution into active measures so as to sustain the sustainable impact witnessed during the lockdown. Thus, the inclusion of this policy brief within the framework of the State Pollution Control Boards of India can strengthen their action plans against pollution and assist the organizations in reducing pollution levels further. This official endorsement of measures adopted to fight pollution can be furthered with adoption of the policies into existing national missions and programmes, such as AMRUT or the Smart Cities Mission. The policy brief forms a brief yet critical part of the movement towards enhancing environmentally conscious liveability in India. Strengthening partnerships with non-government organizations, with credible data and alligned to the national goals in the domain of sustainable development as well as engaging with their systems, can help to attain the shared vision of a sustainable environment.

Annexures

Table 1: National acts and standards in India

Description	Air Pollution	Water Pollution	Noise Pollution
Pollution Acts & Rules	The Air (Prevention and Control of Pollution) Act, 1981	The Water (Prevention and Control of Pollution) Act, 1974	The Noise Pollution (Regulation and Control) Rules, 2000
	Air (Prevention and Control of Pollution) Rules, 1982	The Water (Prevention and Control of Pollution) Rules, 1975	The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002
	Air (Prevention and Control of Pollution Union Territories) Rules, 1983	The Water (Prevention and Control of Pollution) Cess Act, 1977	
		The Water (Prevention and Control of Pollution) Cess Rules, 1978	
National Standards	National Ambient Air Quality Standards	Water Quality Standards by Bureau of Indian Standards – IS 2296:1992	Ambient Noise Standards,1989 by Central Pollution Control Board, under Environment (Protection) Act of 1986
	Environmental Standards for Ambient Air, Automobiles, Fuels, Industries and Noise, 2000	Drinking Water specifications by Bureau of Indian Standards – IS 10500:1991	Noise Standards for Diesel Generator Sets, September 2002, under Environment (Protection) Act of 1986
	Bharat Stage Emission Standards, 2000		Noise Standards for Firecrackers, October 1999, under Environment (Protection) Act of 1986
	Emission Standards for New Gensets, 2000		Noise Standards for Petrol and Kerosene Generator Sets, September 2000 by Central Pollution Control Board, under Environment (Protection) Act of 1986
			Vehicular Noise Standards, 1990, updated in 2000 by the Ministry of Science and Technology

Table 2: Existing policies in India

Policy Name	Proposer/Proponent	About	Start Year
Air Pollution			
Star rating programme for industries for Jharkhand	Jharkhand State Pollution Control Board	Star Rating programme for industries, Jharkhand was to launch on June 5, 2020 following the Odisha model.	To launch on June 5, 2020 (latest update)
Star rating programme for cities for Maharashtra	Maharashtra Pollution Control Board	On June 4, 2019, Maharashtra launched a star rating programme for cities based on concentration on PM_{10} in air in accordance with the AQI. Action plans were also set up for non-attainment cities.	June 4, 2019
National Clean Air Programme (NCAP)	Ministry of Environment, Forest and Climate Change (MoEFCC)	National Clean Air Programme, by MoEFCC, is a national-level mitigation strategy in place for 102 cities which has a target of achieving a reduction of air pollution by 20–30% by 2024. Dovetailing of the existing policies and programmes including the National Action Plan on Climate Change (NAPCC) and other initiatives of GoI about climate change will be done for the execution of NCAP	January 2019
Emission Trading Scheme	Gujarat Pollution Control Board	Emission Trading Scheme for particulate matter, a regional mitigation strategy was initiated in Gujarat to put a cap on emissions and allow industries to buy and sell credits to maintain emissions below the cap	January 2019
Star rating programme for industries for Odisha	Odisha State Pollution Control Board	Star rating programme for industries, Odisha was launched in September 2018 where 107 industries from 8 highly polluting categories were rated as of December 2019. The rating depends on their particulate matter emissions based on the data from the continuous emission monitoring system.	September 2018

Table 2: Existing policies in India

Policy Name	Proposer/Proponent	About	Start Year
National ban on import of petroleum coke	Indian Government	A national ban was placed on the import of petroleum coke for use as fuel except for feedstock in some industries as of August 17, 2018. However, the cement manufacturing industry, which originally accounted for 75% of its use, is exempted from the prohibition.	August 17, 2018
System of Air Quality and Weather Forecasting and Research (SAFAR)	Ministry of Earth Sciences, developed by the Indian Institute for Tropical Meteorology	System of Air Quality and Weather Forecasting and Research (SAFAR) is a national initiative introduced by the Ministry of Earth Sciences, developed by the Indian Institute for Tropical Meteorology, and operationalized by India Meteorological Department. It will monitor real-time levels of the pollutants – PM_1, $PM_{2.5}$, PM_{10}, ozone, CO, NO_x, SO_2, benzene, methane, volatile organic compounds, and mercury as well as all the weather parameter for Pune, Mumbai, and Delhi. SAFAR also monitors in real time and predicts AQI for four cities in India which are Pune, Ahmedabad, Mumbai, and Delhi.	June 21, 2018
Star rating programme for industries for Maharashtra	Maharashtra Pollution Control Board	Star rating programme for industries for Maharashtra is a regional assessment programme launched on June 5, 2017. Based on the quantity of total particulate matter emitted by them, industries belonging to the 11 categories of 'highly polluting' were tested and rated. A total of 414 industries across 11 sectors in Maharashtra have been listed under this programme.	June 5, 2017`
Temporary scheme of traffic rationing		A temporary scheme of traffic rationing was introduced in Delhi NCR in 2016, 2017, and again in 2019. The scheme allowed private vehicles with registration numbers ending with an odd digit to ply on odd dates and those with an even digit on even dates.	2016
Banned the plying of petrol vehicles	National Green Tribunal (NGT)	National Green Tribunal in 2015 banned the plying of petrol vehicles older than 15 years and diesel vehicles older than 10 years in the National Capital Region.	2015

Table 2: Existing policies in India

Policy Name	Proposer/Proponent	About	Start Year
National Air Quality Index (NAQI)	Central Pollution Control Board (CPCB)	National Air Quality Index launched in April 2015 by Central Pollution Control Board monitors eight pollutants – PM_{10}, $PM_{2.5}$, NO_2, O_3, CO, SO_2, NH_3, Pb, and displays performance on the AQI scale of six categories. It is implemented in 71 cities and uses 134 real-time Continuous Ambient Air Quality Monitoring stations (CAAQMS).	April 2015
Ethanol Blended Petrol Programme	Government of India	Ethanol Blended Petrol Programme initiated in January 2003 to promote the use of alternative and environment-friendly biofuels and to reduce import dependency for energy requirements. The government aims to achieve a 10% blending percentage of ethanol in petrol by 2022.	January 2003
Bharat stage emission standards for vehicles	Central Pollution Control Board and Ministry of Environment, Forest and Climate Change	Bharat stage emission standards for vehicles by the Central Pollution Control Board and the Ministry of Environment, Forest and Climate Change are emission standards to regulate air pollutants from compression and spark ignition engines including motor vehicles. Introduced in 2000, the national programme is currently in stage 6 as of April 1, 2020.	2000
National Air Quality Monitoring Programme (NAMP)	Central Pollution Control Board	National Air Quality Monitoring Programme by Central Pollution Control Board is a national-level monitoring initiative that measures SO_2, NO_2, PM_{10}, $PM_{2.5}$ along with meteorological parameters of wind speed, direction, relative humidity, and temperature for 307 cities.	1984–85

Table 2: Existing policies in India

Policy Name	Proposer/Proponent	About	Start Year
Water Pollution			
Suggestive actions for the formulation of action plan for usage of treated wastewater from sewage treatment plants	Central Pollution Control Board	On April 24, 2019, Central Pollution Control Board initiated suggestive actions for the formulation of action plan for usage of treated wastewater from sewage treatment plants. Those are estimate present and projected sewage generation and treatment capacity; identify bulk users of water; quantify their potential water demand; development of dead water aquatic sources (lake, pond, etc.); timeline for establishing such infrastructure (treatment, conveyance, and utilization of treated sewage); promote use of treated wastewater for various usages; promote supply of treated sewage to industrial clusters	April 24, 2019
Directions for implementation of Zero Liquid Discharge	Ministry of Water Resources, River Development and Ganga Rejuvenation	Directions for zero liquid discharge were issued in 2016 for the fermentation industry-distilleries, malteries and breweries amongst others. They emphasise that the sector will ensure zero liquid discharge within 24 months of the date of notification and, till then, "given standards shall be applicable".	2016
National Water Framework Bill, 2016	Ministry of Water Resources, River Development and Ganga Rejuvenation	National Water Framework Bill, 2016 sets the principle for water pricing and states that water used for commercial agriculture and industry should be priced on full economic pricing basis and for domestic use, a graded pricing system may be adopted. Water charges should be determined on a volumetric basis after taking into consideration equity and efficiency.	2016

Table 2: Existing policies in India

Policy Name	Proposer/Proponent	About	Start Year
Financial assistance for installation of Common Effluent Treatment Plants	Ministry of Environment, Forest and Climate Change	Financial assistance for installation of Common Effluent Treatment Plants for clusters of small-scale industrial units or in an industrial estate is available from the Ministry of Environment, Forest and Climate Change	2015
Online Effluent Monitoring System	Central Pollution Control Board	Installation of Online Effluent Monitoring System to check the discharge of effluent directly into the rivers and waterbodies was directed by the Central Pollution Control Board in February 2014, for the 17 categories of highly polluting industries to help track the discharges of pollutants from these units	February 2014
National Plan for Conservation of Aquatic Eco-systems (NPCA)	National Water Mission for Conservation & Management of Lakes & Wetlands	National Plan for Conservation of Aquatic Eco-systems was issued by the National Water Mission for conservation and management of lakes and wetlands	2013
Water Quality Index (WQI)	Central Pollution Control Board	A Water Quality Index was developed by the Central Pollution Control Board. Four parameters (dissolved oxygen, biochemical oxygen demand, faecal coliform, and total coliform) are used for calculating WQI for surface water and the classification contains four categories from non-polluted to heavily polluted. For groundwater quality, nine parameters – pH, total hardness, calcium hardness, magnesium hardness, chloride, total dissolved solids, fluoride, nitrate, sulphate – are tested and then classified into a table of five categories from excellent to unsuitable for drinking.	2012

Table 2: Existing policies in India

Policy Name	Proposer/Proponent	About	Start Year
National River Conservation Plan (NRCP)	Ministry of Water Resources	Implementation of National River Conservation Plan handled by the Ministry of Water Resources for abatement of pollution in identified stretches of various rivers and undertaking conservation activities which inter alia include interception and diversion of raw sewage, construction of sewerage systems, setting up of sewage treatment plants, low-cost sanitation facilities, education and awareness creation, community participation, electric/ improved wood crematoria, and riverfront development	June 1985
National Water Monitoring Programme (NWMP)	Central Pollution Control Board	The National Water Monitoring Programme to monitor water quality was set up for the Central Pollution Control Board and currently has 4111 monitoring stations covering rivers, lakes, ponds, tanks, sewage treatment plants (STP), groundwater, treatment plants, etc. The monitoring is done on a monthly or quarterly basis in surface waters and on half-yearly basis in the case of groundwater. Presently, the inland water quality monitoring network is operated under a three-tier programme, that is, GEMStat by the United Nations Environment Programme, Monitoring of Indian National Aquatic Resources System, and Yamuna Action Plan.	1978

Table 2: Existing policies in India

Policy Name	Proposer/Proponent	About	Start Year
Noise Pollution			
Honk More, Wait More	Mumbai Police	At the local level, Mumbai Police started a unique and novel initiative – Honk More, Wait More – in January 2020. To discourage incessant honking, wait time is increased by traffic signals if noise level at that junction is above 85 decibels.	January 2020
National Initiative for Safe Sound (NISS)	Indian Medical Association, Kerala and Association of Otolaryngologists of India, Kerala	An awareness campaign was initiated by Indian Medical Association, Kerala and Association of Otolaryngologists of India, Kerala in August 2019. The campaign 'National Initiative for Safe Sound' (NISS) aims to educate public on the ill effects of noise pollution and the precautions to take to prevent those effects.	August 2019
Musical, multi-toned and pressure horns, air horns, pipe horns banned	Central Pollution Control Board	Musical, multi-toned and pressure horns, air horns, and pipe horns banned as per a prohibitory order by Central Pollution Control Board in 2017 in metropolitan cities. The offenses were deemed punishable by fine. Unnecessary honking and noisy silencers are punishable offenses as per the India Motor Vehicles Act.	2017
National Ambient Noise Monitoring Network (NANMN)	Ministry of Environment, Forest and Climate Change	National Ambient Noise Monitoring Network by the Ministry of Environment, Forest and Climate Change is a real-time monitoring system in place from 2011 for seven Indian cities. A plan to extend it to 35 stations in 2012 has not come through as of 2018	2011

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About GRIHA Council

GRIHA is an acronym for Green Rating for Integrated Habitat Assessment. GRIHA is a Sanskrit word meaning – 'Abode'. Human Habitats (buildings) interact with the environment in various ways. Throughout their life cycles, from construction to operation and then demolition, they consume resources in the form of energy, water, materials, etc. and emit wastes either directly in the form of municipal wastes or indirectly as emissions from electricity generation. GRIHA attempts to minimize a building's resource consumption, waste generation, and overall ecological impact to within certain nationally acceptable limits / benchmarks.

Going by the old adage 'what gets measured, gets managed', GRIHA attempts to quantify aspects such as energy consumption, waste generation, renewable energy adoption, etc. so as to manage, control and reduce the same to the best possible extent.

GRIHA is a rating tool that helps people assesses the performance of their building against certain nationally acceptable benchmarks. It evaluates the environmental performance of a building holistically over its entire life cycle, thereby providing a definitive standard for what constitutes a 'green building'. The rating system, based on accepted energy and environmental principles, will seek to strike a balance between the established practices and emerging concepts, both national and international.

The benefits

On a broader scale, this system, along with the activities and processes that lead up to it, will benefit the community at large with the improvement in the environment by reducing GHG (greenhouse gas) emissions, reducing energy consumption and the stress on natural resources.

Some of the benefits of a green design to a building owner, user, and the society as a whole are as follows:

- Reduced energy consumption without sacrificing the comfort levels
- Reduced destruction of natural areas, habitats, and biodiversity, and reduced soil loss from erosion etc.
- Reduced air and water pollution (with direct health benefits)
- Reduced water consumption
- Limited waste generation due to recycling and reuse
- Reduced pollution loads
- Increased user productivity
- Enhanced image and marketability

For more information, please visit: **https://www.grihaindia.org/**

About TERI

The Energy and Resources Institute (TERI) is an independent, non-profit organization, with capabilities in research, policy, consultancy and implementation. TERI has multi-disciplinary expertise in the areas of energy, environment, climate change, resources, and sustainability.

With the vision of creating innovative solutions for a sustainable future, TERI's mission is to usher in transitions to a cleaner and more sustainable future through the conservation and efficient use of the Earth's resources and develop innovative ways of minimizing waste and reusing resources.

TERI's work across sectors is focused on:

- Promoting efficient use of resources across sectors
- Increasing access and uptake of sustainable practices
- Reducing the adverse impact on environment and climate

TERI works with a diverse range of stakeholders across governments, both at the national and state levels, international agencies, and civil society organizations to help deliver research-based transformative solutions. Headquartered in New Delhi, TERI has regional centres and campuses in Bengaluru, Gurugram, Guwahati, Mumbai, Nainital, and Panaji.

Currently, TERI's work is structured around seven sectors:

- Agriculture
- Climate
- Energy
- Environment
- Habitat
- Health and Nutrition
- Resources

TERI brings out Discussion Papers on key contemporary issues in sectors such as energy, agriculture, water and environment with multi-disciplinary and multi-sectoral implications for use by policy makers, legislators, researchers and practitioners.

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