

GAIL (India) Limited

**Impact Assessment Report on Support for
establishment of sustainable green cover
to combat the problem of air pollution in the
urban areas of Delhi (FY 19-20 & 20-21)**



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1.1 Executive Summary

Air pollution was the fourth leading risk factor for early death worldwide in 2019, surpassed only by high blood pressure, tobacco use, and poor diet¹.

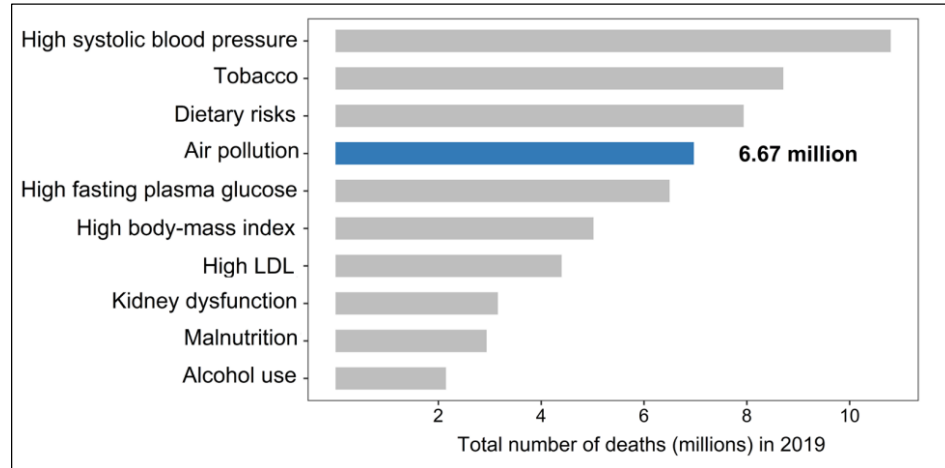


Figure 1: Source- State of Global Air

In 2019, India unveiled its National Clean Air Programme with the goal of lowering outdoor PM 2.5 concentrations by 2024. The program has been criticized for not having a legal mandate and focusing only on cities, but it has increased state and local involvement in the issue of air pollution. The country started using Bharat Stage VI (BS-VI) vehicle emission standards in April 2020, which is likely to pay off in the coming years. The COVID-19 pandemic, on the other hand, has sparked concerns that the switch's full implementation might be delayed.

Air pollution is a major environmental issue that affects the health and well-being of individuals and communities worldwide. Apart from the above- mentioned interventions, one effective strategy for reducing air pollution is to establish green cover, such as trees, shrubs, and vegetation, in urban and suburban areas. It is a cost-effective and efficient method to curb air pollution and improve the overall health and well- being of communities. It can be implemented on a small scale, such as planting trees in a neighborhood, or on a large scale, such as creating urban parks and green roofs. It is important to have a comprehensive approach that includes a combination of different strategies and technologies to mitigate air pollution.

Realizing the intensity of the problem, and the significance of taking immediate actions, GAIL (India) Limited had supported the programme

¹ State of Global Air report: HEI.

through a funding of INR hundred lacs, spread over financial years 2020- 21.

To evaluate the impact of the project and understand the perception of the stakeholders, GAIL empaneled KPMG to conduct an impact assessment study. Along with stakeholder consultations, review of documents and data provided by the team was undertaken to understand the objective and coverage of the project. Subsequent to the desk review, key performance indicators were identified and finalised, in consultation with the programme team. For the purpose of this study, OECD- DAC (Organisation for Economic Co-operation and Development- Development Assistance Committee) framework was used for developing the research tools (questionnaires for qualitative surveys) and evaluating the impact created.

It was found that the initiative was successfully implemented and contributed its bit towards sustainability as well as combating air pollution. 6000 saplings were planted with a remarkable survival rate of 84%, which was 4% higher than the targeted survival rate. The nearby communities were also mobilized and made aware of the importance of the initiative.

1.2 Introduction

1.2.1 CSR at GAIL

GAIL (India) Limited, conferred with the status of Maharatna in 2013, is India's leading natural gas company with diversified interests across the natural gas value chain of trading, transmission, LPG production, LNG-regasification, petrochemicals, city gas, etc. It owns and operates a network of around 14617 km of natural gas pipelines spread across the length and breadth of country. GAIL firmly believes that meeting people's needs, enhancing communities, and safeguarding the environment will ultimately determine how long progress can be sustained.

Pursuant to the provisions of the Companies Act, 2013 and rules made thereunder including the statutory modifications/ amendments from time to time as notified by the Government of India, GAIL (India) Limited earmarks two percent of its average net profit of the preceding three financial years towards achieving its CSR objectives through implementation of meaningful and sustainable CSR programmes.

1.2.2 GAIL CSR Vision

GAIL, through its CSR initiatives, will continue to enhance value creation in the society and in the community in which it operates, through its services, conduct & initiatives, so as to promote sustained growth for the society and community, in fulfillment its role as a Socially Responsible Corporate, with environmental concern.

1.2.3 GAIL CSR Objectives

- Ensure an increased commitment at all levels in the organization, to operate its business in an economically, socially & environmentally sustainable manner, while recognizing the interests of all its stakeholders.
- To directly or indirectly take up programmes that benefit the communities in & around its work centres and results, over a period of time, in enhancing the quality of life & economic well-being of the local populace.
- To generate, through its CSR initiatives, goodwill, and pride for GAIL among stakeholders and help reinforce a positive & socially responsible image of GAIL as a corporate entity.

1.2.4 About the project/ programme

A spectacular variety of life exists in the diverse biomes of India, which ranges from the driest desert to the moistest rain forests, from the highest mountains to the deepest ocean trenches. This life can be found in a stunning range of forms, sizes, colours, life cycles, and interactions. Just 17 of the world's 196 countries contain 70% of its biodiversity², earning them the title "megadiverse." India is one of these megadiverse countries with 2.4% of the land area, accounting for 7-8% of the species of the world, including about 91,000 species of animals and 45,500 species of plants, that have been documented in its ten bio-geographic regions³.

However, relentless pursuit of economic growth coupled with climate change has brought an unprecedented one million species at the doorstep of extinction⁴. Another recently released 'Making Peace with Nature' report by United Nations Environment Programme (UNEP) describes the Triple Emergency facing humanity- Climate Change, Biodiversity loss and Pollution. These anthropogenically inflicted planetary crises are inter-related with overlapping causes and solutions. The cost of focusing on one in silos would be exorbitant in terms of time, energy, and cost. The impacts brought about by the changing climate as a result of the accelerating pollution and global warming are projected to be severe, widespread, and potentially irreversible with differential effects across sectors and sections of society.

According to World Health Organization, toxic air is now the biggest environmental risk, and air pollution is increasing at an ever- alarming rate. Rising urbanization, booming industrialization, and associated anthropogenic activities are the prime reasons that lead to air pollutant emissions and poor air quality. Air pollution control programs have focused on emissions from point and area sources since the Air (Prevention and Control of Pollution) Act of 1981, and many communities have benefited from these programs. Despite the high level of control applied to many point sources, the majority of states in India still continue to struggle with particulate nonattainment issues caused by aerosols of unknown origin. According to a recent report 'Pollution and health: A Progress Update', published in The Lancet Planetary Health, Air Pollution was responsible for 16.7 lakh deaths in India in 2019, or 17.8% of all deaths⁵. Additionally, the report also highlighted that India faced the highest per capita pollution exposure (83.2 ug/ cubic meter) in the world⁶.

² World Atlas, 2021.

³ World Atlas, 2021.

⁴ Global Assessment Report: United Nations Environment Programme. 2019.

⁵ Pollution and Health: A progress update. 2019.

⁶ Pollution and Health: A progress update. 2019.

As per the World Air Quality report, India is the third most polluted country in the world. Additionally, 22 of the world’s 30 most polluted cities are in India⁷, whereas Delhi is the world’s most polluted capital.

Air pollution in Delhi- NCR and the Indo- Gangetic Plains is a complex phenomenon that is dependent on a variety of factors:

- i. **Change in wind direction:** October usually marks the withdrawal of monsoons in Northwest India and during this time, the predominant direction of winds is northwesterly. The direction of the wind is northwesterly in summers as well, which brings the dust from northern Pakistan and Afghanistan.
- ii. **Reduced wind speed:** High-speed winds are very effective at dispersing pollutants, but winters bring a dip in wind speed overall as compared to in summers which makes the region prone to pollution. Also, Delhi lies in a landlocked region which does not have a geographical advantage that eastern, western, or southern parts of the country enjoy where the sea breeze disperses the concentrated pollutants.
- iii. **Stubble Burning:** Stubble burning in Punjab, Rajasthan and Haryana is blamed for causing a thick blanket of smog in Delhi during winters. It emits large amounts of toxic pollutants in the atmosphere which contain harmful gases like methane (CH₄), carbon monoxide (CO), volatile organic compounds (VOC) and carcinogenic polycyclic aromatic hydrocarbons. Farm fires have been an easy way to get rid of paddy stubble quickly and at low cost for several years.
- iv. **Dust Storm:** Dust storms from Gulf countries enhance the already worse condition. Dry cold weather means dust is prevalent in the

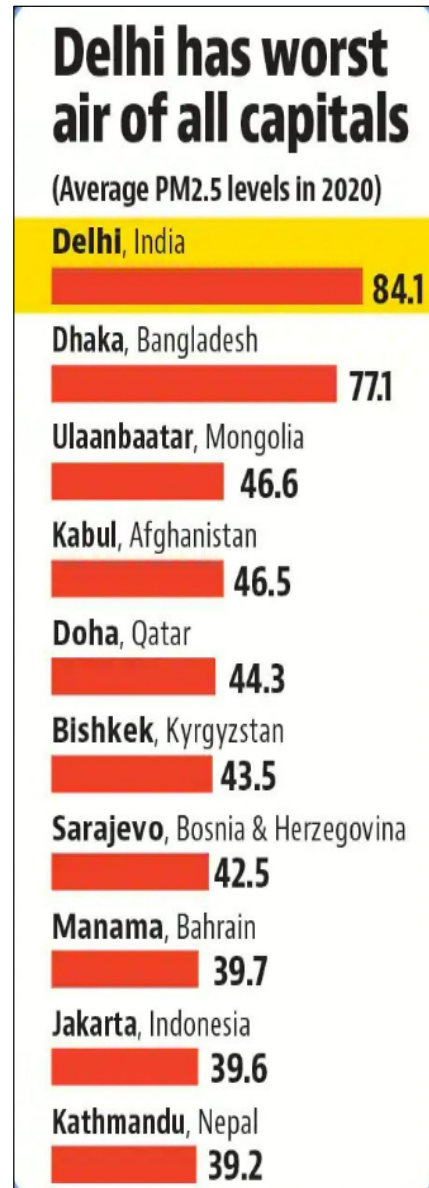


Figure 2: Source- World Air Quality Report

⁷ World Air Quality Report: IQAir. 2020

entire region, which does not see many rainy days between October and June. Dust pollution contributes to around 56% of PM10 and the PM2.5 load.

- v. **Dip in temperature:** As temperature dips, the inversion height is lowered and the concentration of pollutants in the air increases when this happens.
- vi. **Firecrackers:** Despite the ban on cracker sales, firecrackers are a common sight on Diwali. It may not be the top reason for air pollution, but it definitely contributed to its build-up.
- vii. **Construction Activities and Open Waste Burning:** Large-scale construction in Delhi-NCR is another culprit that is increasing dust and pollution in the air. Delhi also has landfill sites for the dumping of waste and burning of waste in these sites also contributes to air pollution.

Air has a certain chemical composition. Any variation in this composition, caused by pollutants, leads to air pollution.

Table 1: Types of air pollutants

Primary Pollutants	Secondary Pollutants
Pollutants that directly cause air pollution	Pollutants that are formed by the intermingling and reaction of primary pollutants

Even in small amounts, some air pollutants can sometimes be fatal and pose serious risks to both the human health and environment. Effects of air pollution have impaired human health for a long time. Ever since the industrial revolution, humans have been pumping out large volumes of carbon dioxide and other greenhouse gases. This has posed a high risk to humans in terms of cardiovascular diseases, lung diseases, cancer, and deteriorating central nervous system⁸. Smog can damage the lungs and irritate the eyes and throat, particularly in children, the elderly, and those who work or exercise outside. It's even worse for asthmatics and allergy sufferers. These additional pollutants may make their symptoms worse and cause asthma attacks. Soot's tiniest airborne particles, whether gaseous or solid, pose a particular threat because they have the potential to enter the bloodstream and lungs, aggravate bronchitis, trigger heart attacks, and even speed up death⁹.

⁸ Air Pollution: National Resources Defense Council (NRDC)

⁹ Air Pollution: National Resources Defense Council (NRDC)

Air pollution has a variety of negative effects on the environment. It can damage crops and forests, harm water bodies, and decrease air quality. It also contributes towards climate change by releasing greenhouse gases into the atmosphere.

In response, various steps have been taken by the government (central and state governments) to tackle the menace of air pollution in Delhi-NCR. The Ministry of Environment, Climate Change, and Forests (MoEF) notified *Graded Response Action Plan (GRAP)* in 2017 to institutionalize measures when the air quality in Delhi deteriorates beyond a certain threshold¹⁰. The *Odd-even rule* was introduced by the Delhi Government according to which vehicles with odd and even registration numbers would ply on the road on alternate days. This was particularly aimed at reducing smog in the region.

Increasing green cover is another key strategy in combating air pollution. Trees and other vegetation can help to absorb pollutants and improve air quality. Additionally, they can help to cool the city and reduce the urban heat island effect, which can exacerbate air pollution. One way to increase green cover is through the planting of more trees and bushes in public spaces and along roadsides.

Acknowledging the relevance of increasing green cover to combat air pollution, GAIL (India) Limited, in collaboration with Society for Action in Community Health (SACH) and Bennet, Coleman & Co. Ltd., initiated the project GAIL Harit for establishment of sustainable green cover to combat the problem of air pollution in urban areas of Delhi. The objective of the programme is to curb the pollution via mass afforestation and vertical gardens.

The project included the following three components:

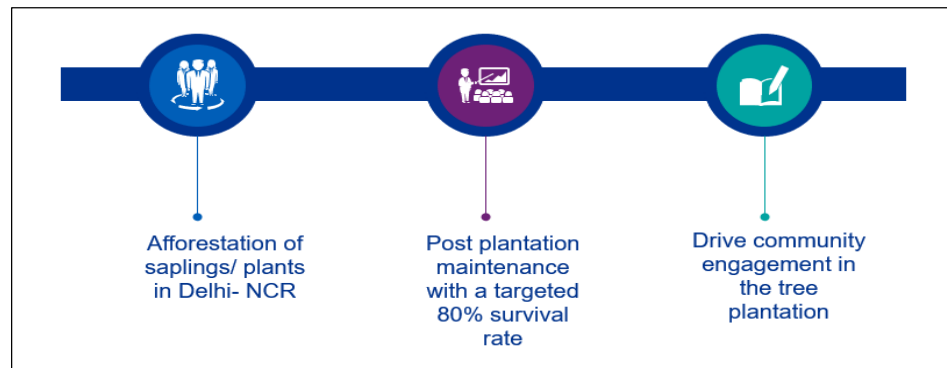


Figure 3: Programme Components

¹⁰ Press Bureau India. 2018.

1.3 About the Implementing Agency

I. Society for Action in Community Health (SACH)

SACH was founded in 1988 with an initial focus on public advocacy to improve the access of the urban poor to public health services in India.

During the course of time, recognizing the need to address the multifaceted dimensions of poverty and deprivation, it strived to expand beyond the health issues related to urban poor and engaged towards sustainable interventions across various sectors.



Figure 4: Focus areas of SACH

II. Bennet, Coleman & Co. Ltd (BCCL)

BCCL (Business name- The Times Group) is an Indian media conglomerate, which has been a long- standing leader in the print business. It is a leading entity, and owns key brands such as The Economic Times, Femina, Times Now, ET Now, etc.

1.4 Methodology and Approach

GAIL has been implementing successful CSR initiatives based on community needs. A third-party evaluation of the results attained is essential given the dynamic nature of the social development programmes deployed. This impact assessment aims to explain what has been done well and what can be done moving forward. It will not only assist in determining the significance of the project, including the efficiency of project design and interventions, sustainability of results, and impact of the intervention on the target community, but it will also provide guidance for expanding or replicating the successful initiatives while redesigning or ending the projects/ initiatives that were unable to have the intended impact.

The impact assessment is intended to provide key insights on the following questions:

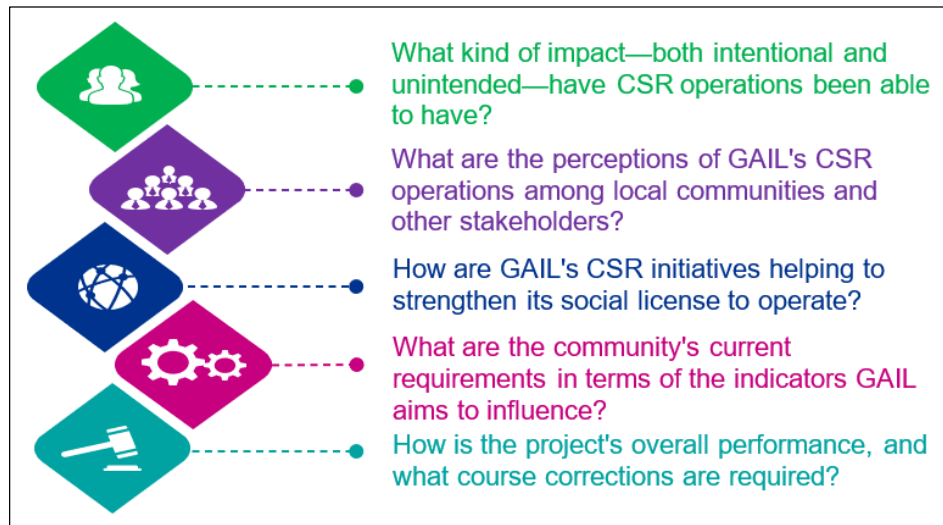


Figure 5: Research questions

The study was conducted through qualitative data collection techniques. This includes in-depth interviews with key stakeholders, as well as secondary research in the multiple thematic areas for a baseline perspective.

1.4.1 OECD DAC: Evaluation Criteria

Given the fundamental approach for conducting an impact study, the OECD-DAC (Development Assistance Committee) Evaluation Network's framework is well regarded for assessing the efficacy of development programmes. In response to the need for a method through which bilateral development agencies could monitor the financing supplied to multilateral organisations for various development initiatives, the DAC Evaluation Network developed a set of evaluation criteria for measuring the performance of any development project (UNICEF, 2012).

In 1991, the OECD Development Assistance Committee (DAC) devised the criteria for assessing international development cooperation. They are now widely used beyond the DAC and have established themselves as a cornerstone of evaluation methodology. These standards have routinely been used for international donors, including UN agencies (OECD, 2020).

The OECD DAC Network has identified six evaluation criteria: relevance, coherence, effectiveness, efficiency, impact, and sustainability. These criteria are meant to help facilitate evaluations. They were revised in 2019 to improve the accuracy and utility of assessment and to strengthen the evaluation's contribution to sustainable development (OECD, 2020).

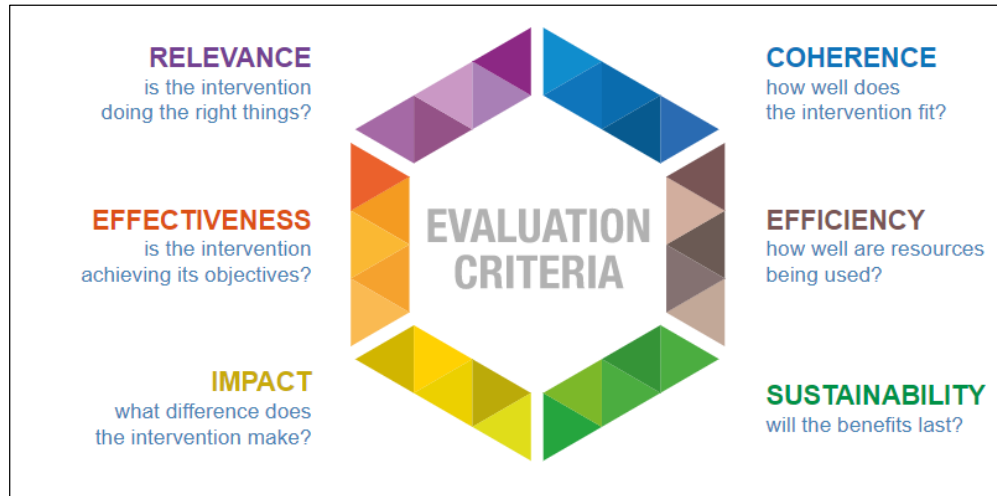


Figure 6: OECD- DAC Framework

1.4.2 Geographical Coverage

The impact assessment for this programme was conducted in near Noida Special Economic Zone (NSEZ) at Dadri- Surajpur Road (Delhi/NCR).

1.4.3 Data Collection and Analysis

To conduct impact assessment, KPMG carried out the data collection exercise virtually with assistance from GAIL CSR SPOCs.

With the help of pre-designed questionnaires, in-depth interviews were conducted with the relevant stakeholders, through telephonic means and Microsoft Teams for data collection. The data was later updated and translated into excel sheets. Following data collection and cleaning, the data was analysed, and the outcomes were utilised to assess the project's impact.

1.4.4 Stakeholder Map

Stakeholders play an imperative role in project implementation on the ground. Stakeholder involvement can offer insightful information that aids in making critical decisions for the organisation. They can aid in

designing improved guidelines, processes, and systems, as well as future communications and plans. Institutions and stakeholders taking part in the exercise include:

Table 2: Stakeholder Map

Project	Type of Stakeholder	Number of stakeholders
Support for establishment of sustainable green cover to combat the problem of air pollution in the urban areas of Delhi (FY 19-20 & 20-21)	Implementation agencies	4
	GAIL CSR Project SPoC	1

1.4.5 Impact Map

Table 3: Impact Map

Thematic Area	Location	Project Name	Implementing Agency	Overall Objective	Key Activities	Key Outputs	Key Outcomes	Impact
Environmental sustainability [item no. (iv), Schedule VII, Companies Act 2013]	Near Noida Special Economic Zone (NSEZ) at Dadri-Surajpur Road (Delhi/NCR).	Project 18: Support for establishment of sustainable green cover to combat the problem of air pollution in the urban areas of Delhi (FY 19-20 & 20-21)	Bennett, Coleman & Co. Ltd (BCCL) and Society for Action in Community Health (SACH)	The objective of this programme is to establish sustainable green cover via mass afforestation and vertical gardens to combat the problem of pollution in Delhi/NCR.	<ul style="list-style-type: none"> Plantation of 15000 saplings/plants Post-plantation maintenance Community engagement in the tree plantation via media campaigns before tree 	<ul style="list-style-type: none"> No. of saplings planted in the designated location No. of awareness sessions/campaigns conducted on importance of tree plantation No. of media campaigns organized before the initiative No. of pre-plantation activities conducted on the plantation sites No. of maintenance activities conducted 	<ul style="list-style-type: none"> Percentage saplings that survived the tree plantation Increase in plant cover in the designated area Increase in awareness of the community members Periodic monitoring of the plantation sites 	<ul style="list-style-type: none"> Improved availability of green cover in the designated area Increase in native variety plant cover



1.5 Scoring Matrix

A scoring guideline was designed where OECD DAC parameters were scored and bundled basis our understanding of the project and availability of information. Weights were assigned to the bundled OECD DAC parameters. Also, a parameter on Branding was included to understand the community’s awareness on the project. Various components within the parameters have been assigned scores. Weights and scores have been used to compute the overall score for each district.

The following scoring matrix was developed to rate the performance of the projects across districts:

Table 4: Scoring matrix

OECD Parameters	Indicators	Weightage	Combined Weightage
Relevance	Needs Assessment Report	20%	W1: 40%
	Relevance to target beneficiaries	50%	
	Alignment to SDGs	30%	
Coherence	Alignment with national policy	50%	W1: 40%
	Alignment with GAIL CSR policy	50%	
Efficiency	Timeline Adherence: Project Completion	40%	W2: 40%
	Duplication	20%	
	Adherence: Budget	40%	
Effectiveness	Identification of problem	50%	
	Process driven implementation strategy	25%	
	Qualified implementation team	25%	
Impact	Increase in green cover	40%	
	Decrease in air pollution	30%	
	Community awareness and mobilization	30%	
Branding	Visibility (visible/word of mouth)	100%	W3: 10%
Sustainability	Sustainability Mechanism, Convergence	50%	W4: 10%
	Maintenance of planted saplings	50%	
Score= W1*Average (Relevance, Coherence) + W2*Average (Efficiency, Effectiveness, Impact) + W3* (Branding) + W4* (Sustainability)			



1.6 Impact Assessment

1.6.1 Relevance of Intervention

Relevance is a measure of how much the intervention objectives and design respond to the needs, beliefs, and priorities of the beneficiaries and continue to do so even if circumstances change.

Relevance measures how effectively a programme is aligned with the goals and policies of the government in which it is implemented. It also aims to know if the programme is relevant to the needs of the beneficiaries. The program's relevance is understood in this context in terms of community needs as well as linkages to existing government operations.

Air pollution has emerged to be a major problem, especially in urban areas. Due to the variety and complexity of the mix of air polluting sources, the problem becomes more complicated. Delhi, a major hub for business, industry, and education, has grown dramatically in recent years. Delhi, like many other large cities, is negatively impacted by urbanization issues. Serious environmental issues have arisen as a result of the rapidly expanding population, as well as the rapid expansion of vehicle ownership, construction, and energy consumption.

Despite numerous efforts to reduce air pollution, it continues to pose a threat to public health. Over the course of the past two decades, Delhi/NCR has taken actions in nearly every sector to reduce air pollution, including the relocation of polluting industries, the implementation of improved vehicle emission standards, the phaseout of lead from gasoline, the reduction of sulphur in diesel and benzene in gasoline, the conversion of the city public transportation fleet to CNG, the prohibition of 15-year-old commercial vehicles, the restriction of transit freight traffic, the prohibition of open incineration/combustion, and the introduction of metro rail¹¹.

Afforestation, or the planting of trees in an area where there was previously no forest, can play an important role in reducing air pollution¹². Trees absorb pollutants through their leaves and bark, and also release oxygen into the air. They also help to reduce carbon dioxide levels, which is a major contributor to air pollution and climate change. In addition to absorbing pollutants, trees also help to reduce the amount of dust and particulate matter in the air by acting as natural filters¹³. This can have a significant impact on air quality, particularly in Delhi, where air pollution is often severe. Additionally, afforestation can also help to reduce the urban heat island effect, which can exacerbate air pollution.

¹¹ Curbing air pollution in Delhi: The Hindu

¹² Delhi Pollution Control Board

¹³ Afforestation: The need of the hour. Science Direct.

Hence, the programme has been extremely relevant and an important step towards curbing the issue of air pollution in Delhi



Figure 7: Plantation site in Noida

1.6.2 Coherence of Intervention

Coherence refers to the compatibility of the intervention with other interventions in a country, sector, or institution.

It measures the extent to which other interventions (particularly policies) support or undermine the intervention, and vice versa.

I. Alignment of the programme with Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs), commonly recognized as the global goals, were established in 2015 by all United Nations members with the purpose of eradicating poverty, protecting the environment, and ensuring that everyone lives in peace and prosperity by 2030. India was a significant contributor to the development of the SDGs and is committed to achieving them by 2030.



Table 5: Coherence with SDGs

SDG Goal	Target	Sub-targets ¹⁴	Coherence
GOAL 13	Climate Action	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	The project's outcomes were targeted at combating the issues caused by air pollution in Delhi- NCR. It would also support in mitigating the larger climate change challenges currently faced due to increased global warming.
GOAL 15	Life on Land	15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	The intervention aimed at increasing sustainable green cover in Delhi- NCR. The intervention is an effective means of reducing air pollution and improving the overall health of communities as well as other forms of life inhabiting the area.

II. Coherence with national priorities:

The project is further aligned with the national and state government goals, policies, and initiatives, as listed below:

Table 6: Coherence with national priorities

Project	Description	Coherence
National Afforestation	This scheme is implemented by the Ministry of Environment, Forest, and Climate Change (MoEFCC) and aims to increase the forest	In line with the vision and objective of the programme, the intervention funded by GAIL aims to increase the green

¹⁴ <https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals>



<p>Programme (NAP)</p>	<p>cover in the country through afforestation and reforestation.</p>	<p>cover in pollution afflicted urban areas of Delhi- NCR.</p>
<p>Green India Mission (GIM)</p>	<p>The Green India Mission (GIM) is a national mission launched by the Government of India in 2010 as part of the National Action Plan on Climate Change (NAPCC). The mission aims to increase green cover and improve the quality of forests in India, with a target of creating an additional carbon sink of 5 to 8 billion tonnes of carbon dioxide equivalent by the year 2030. The mission focuses on increasing the area under forest and tree cover, improving the quality of forests, and creating an enabling policy framework for conservation and sustainable use of forests.</p> <p>The main objectives of the mission are to¹⁵:</p> <ul style="list-style-type: none"> • Increase the forest and tree cover from the current 23% to 33% of the total geographical area of the country. • Improve the quality of forests, including their biodiversity and ecological status. • Enhance the forest-based livelihoods of local communities and ensure their participation in the management of forests. • Promote conservation and sustainable use of forests and biodiversity. • Strengthen the institutional and policy framework for forest conservation and management. 	<p>Project Harit, in line with the broader objectives of GIM, aims to curb the over- arching menace of air pollution, climate change, and global warming.</p>
<p>Van Mahotsav Festival</p>	<p>This is an annual tree planting festival in India, which is celebrated every year during the first week of July. During the festival, large numbers of trees are planted across the country as a symbol of</p>	<p>The programme aims at increasing the sustainable green cover and mobilizing communities as well as other stakeholders to increase awareness on relevance of trees to combat the biggest</p>

¹⁵ Press India Bureau

	conservation and protection of the environment.	challenges that the earth presently faces.
National Clean Air Programme (NCAP)	NACP is a government program that aims to reduce air pollution in India. It includes measures such as increasing afforestation, promoting clean energy, and implementing stricter emission standards for industries.	The programme is in direct alignment with NCAP and aims towards improving air quality in Delhi- NCR through plantation drives at strategically selected locations.

1.6.3 Efficiency of Intervention

The efficiency criterion seeks to determine whether the project was completed in a cost-effective and timely way.

The purpose is to establish whether the inputs- funds, knowledge, time, etc.- were effectively employed to create the intervention outcomes. This evaluation criterion attempts to determine whether the programme was completed on schedule and within budget.

The project has been efficiently implemented in the targeted location with the support of key stakeholders.

- I. ***Timeliness of delivery or implementation of project interventions***
Although the programme was implemented within the given time period by SACH and BCCL with support from GAIL CSR team, a total of 6000 saplings were planted against a target of 15000.
- II. ***Cost efficiency of project activities***
Interaction with the GAIL CSR, SACH, and BCCL team members also revealed that there was no budget overflow and that all the activities were successfully carried out within the allotted budget. Payment milestones were clearly defined as such, and interventions were implemented in the selected location in consultation with the key stakeholders.
- III. ***Duplication/ overlap of project activities***
Duplication of effort arises when similar interventions are needlessly undertaken within the same community/ location due to poor knowledge management and inadequate coordination of projects, thereby resulting in fund and resource inefficiency. The nature of the project is such that there is no scope for duplication.



1.6.4 Effectiveness of Intervention

Effectiveness is defined as an assessment of the factors influencing progress toward outcomes for each stakeholder as well as validation of the robustness of systems and processes.

It aids in ensuring that the implementation and monitoring processes are sturdy in order to achieve the greatest possible social impact. The efficacy of the programme is established by examining how well the program's activities were carried out as well as the efficiency with which the program's systems and processes were implemented.

To effectively achieve these outcomes, the programme adopted the following measures:

- I. **Strategic selection of land:** The land identified for plantation drive was selected such that it is viable for long- term survival of plants.
- II. **Professional team for implementation:** A professional team with prior expertise implementing comparable initiatives was assembled, which included trained botanists. With support from knowledge partner- BCCL, field staff were stationed to efficiently administer and monitor the programme. This helped in maintaining execution quality and providing timely handholding support to beneficiaries.

1.6.5 Impact of Intervention

Impact has been measured in terms of the futuristic vision to address the issue and significant changes observed.

The goal of measuring the impact is to determine the project's primary or secondary long-term impacts. This could be direct or indirect, intentional, or unintentional. The unintended consequences of an intervention can be favourable or harmful.

Establishing green cover, such as planting trees and other vegetation, can have a significant impact on reducing air pollution. Trees absorb pollutants such as carbon monoxide, sulfur dioxide, and nitrogen oxides from the air through their leaves and roots. They also release oxygen and moisture, which can help to improve air quality. In urban areas, green spaces can act as "green lungs," helping to filter and clean the air.

The programme interventions were futuristic in nature, and a necessary step towards sustainability. To create a long- term impact, the following steps were taken:

i. Pre set- up maintenance and site preparation

This included selecting the appropriate site for planting, determining the soil type, and preparing the soil for planting by removing the debris, leveling, and tilling the soil, etc.



Figure 8: Leveling and releveling of ground

ii. Sapling selection and plantation

Appropriate native species were chosen and procured from a nursery. Once done, the saplings were planted after digging holes and adding fertilizers.

Approximately 6000 saplings were planted, and around 2500- 3000 kgs of both biofertilizers (cow dung, etc.) and chemical fertilizers (macro and micro-nutrients) were used in the one year of plantation and maintenance.

10 different varieties of species were planted as saplings which included *Gulmoher, Amaltas, Kachnaar, Chakresia, Papadi, Neem, Jamun, Neelmohar, Pilkhan and Ficus.*

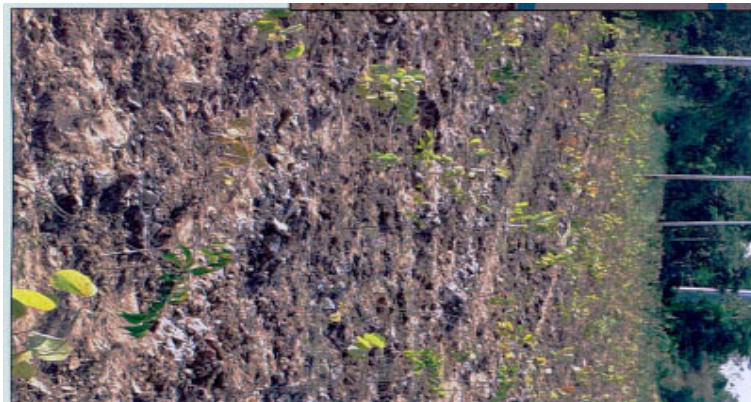




Figure 9: Leveling and releveling of ground

iii. On- going monitoring

The step involved monitoring the saplings for survival, health, and growth. Regular monitoring was done so as to ensure that issues are identified and addressed.



Figure 10: Post- monitoring plant growth

Careful execution of the above- mentioned programme activities had a significant impact in the following ways:

I. Curbing air pollution

Tress/ plants act as natural air filters, absorbing pollutants such as carbon monoxide, sulfur dioxide, and nitrogen oxides from the air through their leaves and roots. This helped in increasing the green cover in the targeted area in a sustainable manner.

Trees absorb carbon dioxide from the atmosphere through photosynthesis and store it as carbon in their biomass. This process, known as carbon sequestration, will also help to mitigate climate change by reducing the amount of CO₂ in the atmosphere.

II. Soil conservation

The planted trees helped to protect the soil from erosion by reducing the impact of rain and wind on the exposed soil. This established a long-term impact for curbing air pollution and mitigating risks relating to climate change.

III. Recreational benefits

Afforestation also helps provide recreational benefits by creating green spaces for people to enjoy. Since the project was undertaken on an otherwise barren land, people from the nearby villages could utilize it for recreational purposes.

1.6.6 Visibility of GAIL/ Branding

The awareness camps that were organized prior to the plantation drive had adequate branding and visibility of GAIL (India) Limited.



Figure 11: GAIL branding during the plantation

1.6.7 Sustainability of Intervention

Sustainability assesses how well the programme secures the long-term viability of its outcomes and influence.

The continuation of a positive effect after development or aid has stopped is referred to as sustainability. This evaluation criterion contains key elements concerning the likelihood of continuous long-term benefits and risk tolerance. To achieve sustainability, a governing framework, financial model, and operating system must be established.

Careful selection of the site for afforestation is important to ensure that the trees planted will have the best chance of survival. Factors such as soil quality, climate, and water availability were the important considerations when the site was selected. Additionally, selection of species plays a significant role as native species have better chance of survival due to better adaptability to the local climate conditions.

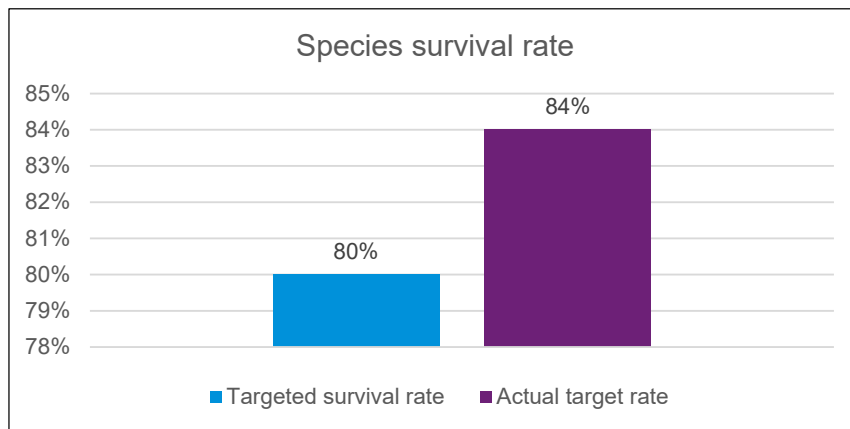


Figure 12: Comparison between targeted and achieved survival rate of plants

1.6.8 Overall rating of the project

The scoring matrix was used to evaluate and score performance of the project in Delhi- NCR. The following table provides the district-wise rating across the defined parameters:

Table 7: Overall scoring of the programme

Location	Relevance	Coherence	Efficiency	Effectiveness	Impact	Sustainability	Branding	Total Score
Delhi- NCR	80%	100%	90%	100%	100%	100%	100%	99%



The programme on establishing sustainable green cover is a futuristic project for improving air quality, mitigating climate change, and providing a wide range of benefits for both the people and environment.

A score of 80% was given for relevance because though the need was clearly identified basis the evident challenges that the entire Delhi- NCR region has been facing in terms of air pollution, there was no need assessment survey conducted specifically before the programme,. Additionally, the programme aim was to plant 15,000 saplings, however, only 6000 saplings were planted. Hence a rating of 90% was given under efficiency of the program.

Overall, the total score of the project came to 99% due to which this project can be rated as “**Highly Impactful**” in nature.

1.7 Conclusion and Way Forward

Air pollution is a major environmental issue that affects human health, the environment, and the economy. It is important to take urgent action to reduce the sources of air pollution and promote sustainable development, through a combination of regulation, investment, and education, in order to protect public health, the environment, and the economy for present and future generations.

In alignment with national priorities, and to effectively address the need for afforestation to curb air pollution, a comprehensive and collaborative approach is required. The following are some potential steps that could be taken to achieve this goal:

- i. **Develop a comprehensive scaled- up afforestation plan:** Develop a plan that takes into account the specific needs and conditions of the area, including the types of trees and other vegetation that are best suited to the local climate and soil, as well as the goals and objectives of the project (e.g. improving air quality, reducing the urban heat island effect, increasing biodiversity, etc.).

Scaling up the project to more suitable locations would further enhance the programme interventions.

- ii. **Increase community participation:** Involve the community in the planning and implementation of the afforestation project. This can help to build support for the project and ensure that it is tailored to the specific needs of the community.
- iii. **Consistent support and secure funding:** Identify and secure funding to support the project, through a combination of public and private funding sources.

- iv. **Use of modern techniques:** Use of modern techniques such as remote sensing, GIS, and drones to identify potential planting sites, assess the suitability of the land, and monitor the progress of the afforestation project.



Figure 13: Overlapping solutions to curb air pollution

- v. **Planting:** Plant a diverse mix of species, including both native and non-native trees and shrubs. This will help to ensure that the trees are well-suited to the local environment and can survive and thrive over the long term.
- vi. **Partnering with organizations:** Partner with organizations such as non-profits, research institutions, and government agencies to increase the scale and impact of the afforestation project.
- vii. **Increase public awareness:** Increase public awareness about the benefits of afforestation for air pollution and other environmental issues and encourage individuals and organizations to take action to support afforestation efforts.

Overall, afforestation is a long-term and multifaceted process that requires careful planning, community involvement, and ongoing support to be successful. It is important to work with experts in forestry and environmental management to ensure that the project is implemented in a sustainable and effective way.



Thank you



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