



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 3, March 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.569

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com



Improving Air Quality in the Built Environment by Standard Approach for Green Belt Design

Mr. Ashitosh S. Magar¹, Prof. Abhay Shelar²

Research Scholar, Department of Civil Environmental Engineering, Anantrao Pawar College of Engineering & Research, Pune, India¹

Professor, Department of Civil Environmental Engineering, Anantrao Pawar College of Engineering & Research, Pune, India²

ABSTRACT: a green belt is a land-use zone designation and policy used in land-use planning to safeguard primarily undeveloped, natural, or agricultural territory adjacent to or surrounding metropolitan areas. A green belt is a land-use zone designation and policy used in land-use planning to safeguard primarily undeveloped, natural, or agricultural territory adjacent to or surrounding metropolitan areas. Greenways, often known as green wedges, are similar concepts with a linear nature that go towards an urban area rather than surrounding it. A green belt is essentially an impenetrable barrier that establishes a border around a certain area, restricting development but allowing animals to return and establish themselves. Greenways, sometimes known as green wedges, are similar concepts with a linear nature that go into rather than around an urban centre.

A green belt is essentially an impenetrable barrier that establishes a border around a certain area, restricting development but allowing animals to return and establish themselves. Green belt effectiveness varies by location and country. They are routinely damaged by urban rural peripheral use, and growth occasionally 'jumps' over the green belt zone, resulting in the emergence of "satellite towns," which, while separated from the city by green belt, function more like suburbs than autonomous communities. In a number of cases, green belts have been used as a land reserve for future motorways and other roadways. Sections of Ontario Highway 407 north of Toronto, as well as the Hunt Club Road and Richmond Road south of Ottawa, are examples. It's debatable whether they were designed this way from the start or are the consequence of a new government filling in gaps left by previous governments.

KEYWORDS: Green belt, Land zone, Jumps, Agriculture, Treatment, greenways, fresh Environment etc

I. INTRODUCTION

A greenbelt is a collection of trees planted in such a way that they constitute an effective barrier between the project and its surroundings. At the same time, the greenbelt absorbs fugitive emissions, reduces noise levels in the existing project, and enhances the attractiveness of the surrounding neighborhood. The greenbelt that will surround the industry wall will be constructed with the following objectives in mind.

- In each row, trees will be planted in staggered rows.
- Short trees will be planted in the first rows, and huge trees in the last rows, all within the scope of the project.
- Plants in front of the trees will be advantageous in giving coverage for this region because tree trunks are often barren of leaves.
- The effective height of the greenbelt must be maintained by leaving enough space between trees.
- Native plants with a fast-growing variety, a large canopy, and a high leaf index are preferred.

What exactly is a Greenbelt?

- Green belt land is land that has been set aside for open space, usually in the form of a park.
- In the vicinity of larger cities The primary goal of the green belt policy is to save the environment.
- To protect larger cities from urban sprawl, and to keep the allocated area for

- Forestry and agriculture, as well as providing wildlife habitat



A greenbelt is a strategy and property use area selection utilized in land use planning to maintain regions of mostly raw, wild, or farming land neighboring urban areas. Similar theories are green wedges, which have a straight identity and may operate through a metropolitan region instead of around it.

II. IN GUARDIANSHIP OF THE GREENBELT

While Ontario's PC Party was successful in stirring up the business community, the Open for Business agenda was not well received by the majority of Toronto people. Despite assertions that removing limits would result in thousands of new jobs and lucrative opportunities for developers, most people considered the proposal as a short-term triumph for a select few and a long-term loss for the majority.

Here's a rundown of the reasons in favour of preserving the Greenbelt and against the Progressive Conservative proposal to develop it.



- Loss of scenic greenery
- Loss of farmland (and higher food prices)
- Threat to clean water supply
- Increased traffic
- Higher property taxes

Green Belt Tree Selection

The effectiveness of a greenbelt is dependent on the tree kind that is most suited to absorb pollutants. The following characteristics should be present in a good greenbelt tree:

- Rapid growth rate for quick roof improvement.
- Strong branches for dependable roof.
- Large leaf size for superior adulterant retention. Lush greenery for effective pollution trapping.

- Long life span for greenbelt longevity;
- Before choosing trees for farming in the greenbelt, it's critical to understand their level of pollution tolerance.



Figure1.2: Selection of Trees for Green Belt

III. LITERATURE REVIEW

John Gallagher a, Richard Baldauf, Atmospheric Environment, Elsevier 2019

These strategies improve air quality by modifying dispersion patterns; avenue trees and vegetation are aesthetically pleasant and provide cooling and shelter from direct sunlight. Furthermore, real-world case studies are seen as a significant avenue for confirming these methodologies in the built environment. The next step in promoting passive solutions for decreasing air pollution and ensuring their integration into future urban planning schemes is to develop design guidelines. Furthermore, establishing communication channels with urban planners will aid in the formulation and implementation of design principles to improve air quality in the built environment.

China Xiaoping Chena, Tingting Pei, Urban Forestry & Urban Greening, Elsevier 2018

In this study, the isolated effects of roadside greenbelts on footpath air quality were investigated by measuring the coarse particles (PM10) removal efficiency of roadside greenbelts with three different vegetation structures in different grade roads. Results indicated that the three kinds of greenbelts can improve footpath air quality to a certain degree (7–15%). Interestingly, the vegetation structure of shrubs and small trees (about 2–4.5 m in height) with small crown diameter shows the highest PM10 removal efficiency along major or heavy traffic roads.

MdNazrulIslama, Khandkar-SiddikurRahman, Urban Forestry & Urban Greening, Elsevier 2017

The greenbelts greatly contributed to reduce TSP pollution and it was as much as 65%. Noise level reduction was also achieved up to 17 dB when compared to the open area. Moreover, TSP removal percentage was correlated to the crown density. Area having higher crown density demonstrated less air pollution and lower level of noise compared to the area having lower crown density. Greenbelt showed better performance in summer time than winter

Jonathan T. Steffens, Yan Jason Wang, K. Max Zhang, Atmospheric Environment Elsevier 2018

In this study, we incorporated the representations of particle aerodynamics and deposition mechanisms into the Comprehensive Turbulent Aerosol Dynamics and Gas Chemistry (CTAG) model, and explored the effects of vegetation barriers on near-road particulate air pollution by comparing the simulation results against field measurements. The model shows generally adequate agreement with concentrations of particles larger, but tends to over predict concentrations of particles less than 50 nm behind a vegetation barrier. Sensitivity tests were performed by comparing two different particle dry deposition models and varying the vegetation density and local meteorology. It was found that an increase in leaf area density further reduces particle concentration, but the responses were non-linear. Increases in wind speed were shown to enhance particle impaction, but reduce particle diffusion, which result in reduction in concentration for particles.



AriyaAruninta, Journal of Environmental Protection, 2019

This paper aims to find an efficient and practical mitigation practice to balance the purposes of the industrial port with protection of surrounding communities and natural resources. The author will apply physical design and planning such as the application of “buffer zones”, “greenbelts”, “set-back”, “green corridor”, “green wall” and “protection strips” along with environmental measurements such as the Air Pollution Tolerance Index, which can be adapted for pollution protection as best practices of landscape architecture.

K.V. Abhijith a, Prashant Kumar, Atmospheric Environment, Elsevier 2017

This review examined published literature on neighborhood air quality modifications by green interventions. Studies were evaluated that discussed personal exposure to local sources of air pollution under the presence of vegetation in open road and built-up street canyon environments.

Gyan Prakash Gupta1 & Bablu Kumar 1 & U. C. Kulshrestha, Saudi Society for Geosciences 2016

The paper also reports air pollution tolerance index (APTI) and air pollution index (API) in order to categorize the selected plants into sensitive and tolerant species against air pollution and their usefulness for green belt development in National Capital Region (NCR) Delhi.

Michael Buxton, 27 Mar 2019.

Green belts may exclude urban uses and still be regarded as both preservationist and multi-functional, so long as uses are limited to rural ones. Rural uses, such as farming, have led to landscapes prized for their beauty, and often preserve remnant vegetation, wetlands and environmental features with cultural significance, such as hedge-rows, which coexist with productive purposes. Many green belts are also important water catchments and provide much used opportunities for recreation. Such multi-functional uses may be essential elements in the preservation of identified attributes in greenbelts.

Jun Yong Hyun and SeomGyeol Lee, MDPI, 25 January 2019

To study with various attribute data to model the spatial effects of greenbelt removal in the cases of three medium-sized cities in Korea. The result of difference-in-difference (DID) analysis confirms that the effects of GB removal on land development vary depending on the local conditions of land development.

Krisztina F. Kovács, Published by Scholar Works, UMass Amherst, 2019

We analyzed the administrative and governance structure of each of the metropolitan areas. We carried out a comparative analysis of spatial strategies of the core cities and agglomeration zones or regions around the city looking for answers for the challenge of urban sprawl and protection of ecologic values.

V.Vijay Kumar, S. Swathy, R. Radhika, International Journal of Applied Environmental Sciences, 2018

Most of the anthropogenic activities generate pollution in one or other types and of different magnitude, for which all the organisms are exposed. In such cases the green belts will be effective in controlling the pollution. Leaves with their vast area in a tree crown, sorbs pollutants on their surface, thus affectively reduce their concentrations in ambient air

OmkarMahdaviaSahilGuravbSudhaChopraaShashank Singh Amir Mahvide, September 2017

The London Metropolitan Green Belt is under threat from house builders who prefer to build on inexpensive greenbelt land rather than pricey brownfield land, as well as those who regard it as a low-cost solution to London's housing crunch. The Landscape Institute is working on a Greenbelt Policy Paper, and the film above was created as a demonstration.

Robert Holden and Tom Turner make contributions to the argument. The Green Belt in London is a large area of land that surrounds the city usually regarded as a popular and effective policy. It should be kept, safeguarded, and protected & enhancedThe video begins by emphasizing that the situation is based on two roles and two histories. The Green Belt concept is a good one. To begin with, it was proposed as a means of limiting London's growth.



Sohail, Kafeel Ahmad, Gurpritsingh (05 May 2016)

Population growth projections will continue to point to the need for the region to be more flexible in its policies to incorporate landscape design. A new development strategy that integrates rural and urban land uses has the ability to solve a variety of regional concerns, re-establish consensus, and foster new landscape relationships.

What If Urban Growth Isn't Sustainable? Boundary extensions were created with the preservation of neighborhood character in mind, as well as soil and natural resource preservation? This project presents a method for choreographing an integrated landscape network that facilitates land use, preservation, development, and environmental gradations. Preservation is no more a black-and-white issue, but rather one that adapts to the unique social and geographic circumstances of each location.

Akira Yuasa, Dong Bingzhi, Deng Huiping, GaoNaiyun, 2019

Which encompasses a large portion of Ankara's urban edge, plays a critical role in preserving the city's ecological balance, as well as its landscape and other natural elements;

Protect natural or semi-natural environments; improve air quality in urban areas; ensure that urban residents have access to the countryside, with educational and recreational opportunities as a result; protect the unique character of rural communities that might otherwise be absorbed by expanding suburbs

Green belt effectiveness varies depending on region and country. They are frequently destroyed by urban rural periphery usage, and in some cases, development 'jumps' over the green belt, resulting in the emergence of "satellite towns," which, despite being separated from the city by green belt, behave more like suburbs than autonomous communities.

William J. Riley, Research Article, 22 July 2020

Green roof installation on existing roofs in Nanchang could provide buffer water storage, reducing peak runoff flow rates during high rainfall events, according to the researchers. As a result, effectively reduce urban flooding. It also improves ET, resulting in lower long-term cumulative runoff quantities. These two phenomena were modelled using 2-hour and long-term periods, respectively. Both of these factors will have an impact on the chance of flooding.

Aim

The main aim of my research is green belts to reduce air pollution and noise pollution, explosion can significantly restrict the spread of adulterant in such situations and boost the aesthetic value and elegance of geographies by assisting with soil safety and erosion casualties and wastewater can be used for Green Belts oversight after being properly treated and converted to manure & it's useful for large number of people in environmental protection.

Problem Statement

“Green belt in soil protection and erosion losses and enhance the aesthetic value and beauty of the landscape. Some of the waste water generated in an industry can be best utilized for green belt maintenance after due treatment for converting them to manure”

Objectives

- ✓ The major goal of green belts is to reduce air pollution and noise pollution.
- ✓ Improvement of Green belts can help produce employment and thus involve mass participation in environmental safety
- ✓ Integrated environment thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers, and end-of-life management of the product after its useful life
- ✓ Assess the particulate matter removal efficiency of Marine side greenbelts by the monitored data, and propose the optimal vegetation configuration of roadside greenbelts based on the assessed results.
- ✓ Green belts allow for significant wastewater reuse & Green belts maintain a balance of oxygen in the atmosphere.

Methodology

The design of the GB and its composition may vary from place to place and industry to industry. Just putting some trees around an industry may not serve the purpose of GB.

The development of GB, by using pollution tolerant plants for air quality improvement, involves selecting suitable plant species, determining climatic conditions, nature of pollutants to be ameliorated and general landscape of the locality.

While selecting the plant species, the characteristics as tolerance, canopy structure, and foliage form, average height of the plant and its overall flowering and production potential should take into consideration. In short, a GB development plan and its design mainly depend upon:

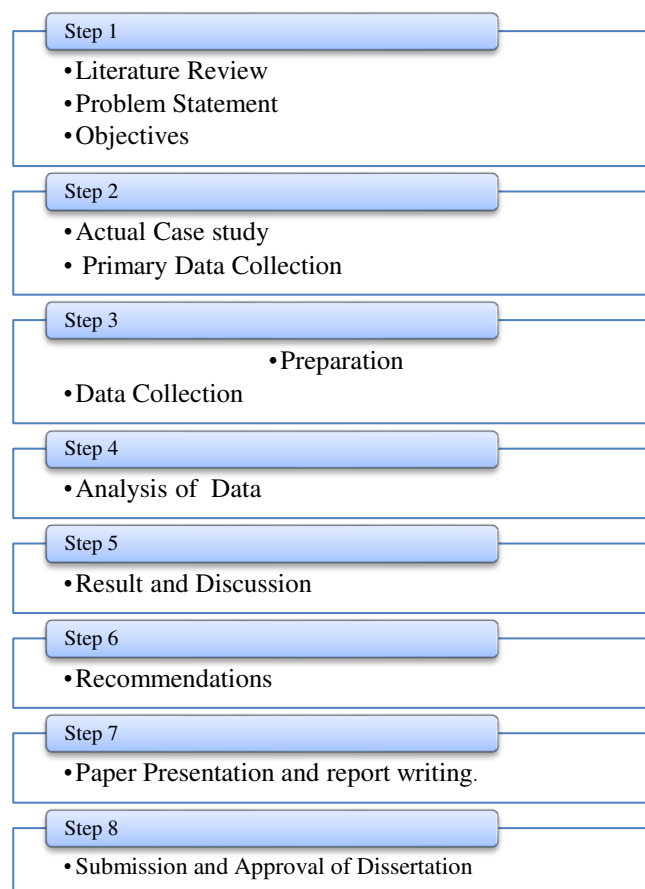


Figure1.3: Flowchart of Methodology

- Nature and extent of pollution load
- Assimilative capacity of the ecosystem to attenuate the pollutants
- Climatic conditions of the locality
- Soil and water quality of that region
- Determine the location of greenbelt for optimal pollutant attenuation
- Assessment of the appropriate width of greenbelt, density of plantations in it, sequence of planting shrubs and trees, tree height, and the overall shape of the greenbelt
- Selection of tree species suitable for different agro-climatic conditions and for different pollutants
- Optimal width of a GB in and around industry is based on pollution attenuation factor of selected plant species



Purpose of Green Belt

The stated objectives of green belt policy are to:

- Protection of natural or semi-natural environments
- Improvement of air quality in urban parts
- Confirm that urban inhabitants have admittance to landscape, with consequent informative and recreational opportunities
- Protection of rural societies that might otherwise be absorbed by expanding cities.

IV. DATA COLLECTION

The Green Belt is a source of contention. Policy arguments about the Green Belt usually fall into one of two categories:

Its effectiveness as a tool for planning (A)

Is the Green Belt supportive to urban redevelopment and the concentration of housing, services, and employment opportunities, or does it obstruct the construction of enough homes?

Is it feasible that other approaches, such as strategic gaps and green wedges, would be more effective in generating a more sustainable urban form?

Is there a need for more flexibility in terms of development permits?

What role does it play in the management of the environment?

Is there any impact on land management on the edges of cities as a result of the Green Belt designation?

Have the Green Belt land use objectives aided in the positive management of land?

What are the most efficient techniques for minimising land deterioration on the fringes of cities while both increasing land production and human benefits?

Green Belt Guidelines, Regulations, and Future Challenges

Development The majority of human activities result in pollution of various forms and magnitudes, which all creatures are subjected to. Pollution is something that organisms tend to avoid or move away from. Organisms struggle to survive in polluted environments, either through avoidance or tolerance.

However, such survival is unattractive and has drawbacks. As a result, it is critical that pollution be regulated at the source. For pollution control, a variety of mechanical devices are available. However, there is still a chance that a trace quantity will be discharged. Green belts are regarded to be effective in such situations. Green plants create a surface that can absorb contaminants from the air.

A key feature of a green belt is that the plants that make it up are living things. These plants can only tolerate a certain amount of pollution in the air. As a result of exceeding pollution load thresholds, plants will be injured, resulting in tissue death and a reduction in their absorption potential. The purpose of a green belt will be defeated. In other words, a green belt works as a pollution sink only within the tolerance limits of the plants that make it up.

When it comes to creating green belts, there are two options to consider.

i) Source-oriented strategy

ii) A receptor-centric strategy:

Both approaches have their own set of benefits and drawbacks. When a single industry is present and pollutants released by that industry are wanted to be contained, it is generally thought that the first option is preferable. In urban-industrial complexes with many sources of pollution in an industrial-urban mix, the latter strategy is preferable.

Green belts would bring various benefits, such as aesthetic improvement and potential habitat for birds and animals, in addition to acting as pollutant sinks.



The following are some guidelines for developing a green belt:

Plant-Pollutant Interactions Green Belt Development Theoretical Models Plant Selection for Green Belts

iii) Plant-based fly-ash stabilisation

Interactions between plants and pollutants

Because plants are living organisms, they are susceptible to the toxicity of air pollutants in the same way that any other organism is. Nonetheless, they should be able to scavenge contaminants from the surrounding air. Here, the most significant main pollutants of industrial origin are considered.

SO₂:

SO₂ is mostly absorbed by plants through the stomata openings. As a result, the structure, position, and activities of stomata are critical in the admission of gas into a leaf. Once inside the leaf, it enters the mesophyll intercellular gaps and is absorbed by the wet cell walls before diffusing into the cell sap. The growth of marginal and interveinal chlorotic, bronzed, or necrotic patches, starting with dark green or dull coloration and a water-soaked look, is the first visible sign of foliar injury produced by SO₂. On both epidermal surfaces, necrotic patches extend and are evident. Because they have just recently reached full expansion, older leaves are the most vulnerable.

NO_x:

NO_x is a term that refers to three different forms of nitrogen oxides. Nitrous oxide, nitric oxide, and nitrogen dioxide are the three. Discolored spots of gray-green or light brown colour, bleached or necrotic spots in interveinal sections of leaves are evident injury symptoms. As phytotoxic agents, NO_x is not regarded to be a big concern.

HF: Fluoride enters the leaf through stomata and diffuses into vascular tissues through mesophyll intercellular spaces. The first evident harm is chlorotic of the leaf tip. Injury to the brown or dead portions of the leaves causes necrosis, which causes premature leaf fall.

Carbon monoxide (CO) and carbon dioxide (CO₂) are not phytotoxic gases.

NH₃: Ammonia injury causes blackening and bleaching of leaves, as well as spotting, brown lesions between veins and fruit colour changes.

H₂S: Young tissue necrosis and death have been recorded rather than old tissue necrosis and death. The following is the order in which plants absorb air pollution.

Green Belt Development Theoretical Models

The deposition velocity of the contaminants has historically been used to describe the interaction of pollution with plants. The deposition velocity is calculated as follows: The pollution attenuation factor is computed using the following parameters in the green belt development model.

Distances from the source, width, height, and leaf surface area density are all physical properties of the green belt.

Wind speed across the green belt and effective height of the incident air stream are examples of aerodynamic qualities.

iii. The pollutant's deposition velocity. iv. Conditions of atmospheric stability

The Green Belt Model in Action

The green belt model is used to investigate the effectiveness of green belts in minimising pollution impacts in various scenarios. The source-oriented technique is one of the two applications, while the receptor-oriented approach is the other. In the source-oriented method, a green belt of appropriate size is planted around a polluting source, and studies are conducted to determine the effectiveness of the green belt in lowering pollution effects at ground level. Green belts of appropriate size are planted around an object that is deteriorating or is anticipated to deteriorate as a result of pollution in the receptor based approach.



An Approach Focused on Receptors

Both the source and receptor oriented approaches are mathematically equivalent; the only difference is the way the green belt is planted. The green belt is planted around the pollution source in the source-oriented method, whereas the receptor is protected from pollution in the receptor-oriented approach by planting a green belt around it.

The protection from pollutants by a green belt is an example of a receptor-oriented approach.

Plant Selection for the Green Belt

The following are characteristics of plants, particularly crown shapes that are thought to be important for pollution gas absorption and dust particle removal:

Freely exposed foliage is achieved through:

- adequate crown height
- canopy openness
- large leaves (long and broad laminar surfaces)
- a large number of stomatal openings

For the removal of particulate debris floating in the air

- Roughness of bark,
- Epidermal outgrowths on petioles
- Height and spread of crown
- Leaves supported on firm petioles
- Abundance of surfaces on bark and foliage, as measured by
- Roughness of bark,
- Epidermal outgrowths on petioles hairs or scales on laminar surfaces,
- Abundance of axillary hairs,
- Hairs or scales on axillary hairs.

Stomata are protected.

Not all tolerant plants are suitable for green belts. For example, Xerophytes with sunken stomata might avoid pollution but are poor pollutant absorbers due to their low gaseous exchange capacity.

Plantation on the Side of the Road

Green belts along roadsides should have components that absorb gases as well as dust particles, including lead particulates. Plants for roadside plantings may be chosen for pollution control and to create a barrier between traffic and roadside dwellings. Plants with a height of 1 to 1.5 metres and trees with a height of 3 to 5 metres should be included in this selection. Trees and bushes should be intermixed in such a way that the foliage area density in vertical is nearly consistent.

Plants for Fly-Ash Stabilization

Plantation Procedures Suggestions Fly ash is lacking in plant nutrients such as nitrogen and, in certain cases, phosphorus, as well as hazardous metals such as copper, cadmium, cobalt, chromium, and manganese, as well as molybdenum nickel, lead, zinc, and boron. Covering ash with plants necessitates the use of fertilizers and toxicant-absorbent substances.

Grass cultivation efficiently stabilizes the ash surface. Grasses with a high shoot turnover rate contribute significantly to the organic enrichment of otherwise nutrient-deficient silty ash. Weathered ash has been found to be significantly less harmful than newly deposited ash. Some plants have been identified as being ideal for growing on ash dumps in order to stabilize them.

Grass, legumes, and MPTs (multi-purpose trees) are among the plants listed, which create a full agroforestry system. Testing edible plant parts for harmful heavy metal levels could aid decision-making when it comes to obtaining agricultural produce from stabilized ash dumps.



Precautions

Pollution stress is caused by a number of factors in the environment. The set of bio-geographical conditions - particularly climate and topography - varies greatly. As a result, matching changes in planting tactics are required. A wide range of local (climate-adapted) plant species must be tested. If any of the species fails to respond as predicted, a detailed examination into the reasons for the failure is required. Corrective actions and plan revisions can be based on the findings of such investigations. Continuous plant growth monitoring, rapid replacement of casualties, nutritional replenishment, and rescheduling of watering regimens, among other things, are critical.

New expectations, new challenges

The land around our cities is constantly confronted with a variety of issues and competing land use goals. The Green Belt strategy has offered a framework for making some decisions in and around cities and towns. It's a simple structure based on the idea that cities require open space and breathing places. Otherwise, urban sprawl would occur, and settlements would grow too large and lose their historic identity.

The green belt policy has successfully protected against this. However, the twenty-first century brings with it new problems and expectations. It is well acknowledged that having access to green spaces within a short distance of one's home is beneficial. Quality places to visit that do not require driving or a long travel by public transportation will be in more demand.

Outdoor places that provide a wide range of environmental benefits and ecosystem services in addition to providing chances for exercise, relaxation, and social interaction; to meet these challenges and expectations on a finite amount of land, Green Belt planning and management will require a multi-functional approach that combines multiple land uses in the same location.

The characteristics of plants that are required for pollution gas absorption and dust particle removal are listed.

V. CONCLUSION

- The goal of the green belt in and around the industry is to reduce pollution of the air and noise.
- By trapping particulate matter, absorbing carbon dioxide and other pollutants from the air, and releasing oxygen, trees help to enhance air quality.
- Green belts will function as a sound barrier between industry and the surrounding region, reducing sound intensity by deflecting, refracting, or absorbing sound.
- The distance that sounds must travel from the source and the width of the greenbelt determine the intensity reduction. Green belts also help to prevent soil erosion by enhancing the quality of the soil and binding soil particles together.
- It also improves groundwater infiltration and recharge capacity by capturing runoff.
- The green belt species should be selected based on the type/category of industry as well as the climate.
- Planting trees around a business may not achieve the goal of a green belt if the above elements are ignored.

ACKNOWLEDGMENT

Corresponding author is thankful to Dr. Sunil B. Thakare the Principal of the Anantrao Pawar College of engineering and research for his continuous motivation and guidance to take initiative to address the issue by designing the effective system to utilize the solid waste and protection of the environment.

We express our sincere thanks to PG coordinator Dr. Sagar Gawande. for his continuous support. We also thankful to our Head of Department of Civil Dr. Sagar Gawande or support

REFERENCES

1. Nirmal, K., Sreejith, A. G., Mathew, J., Sarpotdar, M., Suresh, A., Prakash, A., Safanova, M., Murthy, J., "Noise Modeling and Analysis of an IMU-Based Attitude Sensor: Improvement of Performance by Filtering and Sensor



- Fusion,” SPIE Astronomical Telescopes + Instrumentation Symposium, published online 22 July 2016. doi: 10.1117/12.2234255
2. Challa, M. and Wheeler, C., “Accuracy Studies of a Magnetometer-Only Attitude-and-Rate-Determination System,” NASA Technical Reports Server, Goddard Space Flight Center, Greenbelt, Maryland
 3. Han, A.T.; Go, M. Explaining the national variation of land use: A cross-national analysis of greenbelt policy in five countries. *Land Use Policy* 2019, 81, 644–656, doi:10.1016/j.landusepol.2018.11.035
 4. Poelmans, L.; VanRompae, A. Complexity and performance of urban expansion models. *Comput. Environ. Urban Syst.* 2010, 34, 17–27, doi:10.1016/j.compenvurbsys.2009.06.001
 5. Abadie, A. Semiparametric difference-in-differences estimators; *Rev. Econ Stud.* 2005, 72, 1–19, Available online: <http://www.jstor.org/stable/3700681> (accessed on 25 May 2018).
 6. Han, A.T. Effects of relaxing the urban growth management policy: Greenbelt policy of Seoul metropolitan area, South Korea. *J. Plan. Educ. Res.* 2017, 22, 374–383, doi:10.1177/0739456X17739110.
 7. Longley, P.; Batty, M.; Shepherd, J.; Sadler, G. Do green belts change the shape of urban areas? a preliminary analysis of the settlement geography of South East England. *Reg. Stud.* 1992, 26, 437–452, doi:10.1080/00343409212331347101.
 8. Jun, M.-J.; Kim, H.-J. Measuring the effect of greenbelt proximity on apartment rents in Seoul. *Cities* 2017, 62, 10–22, doi:10.1016/j.cities.2016.11.002.
 9. Siedentop, S.; Fina, S.; Krehl, A. Greenbelts in Germany’s regional plans: An effective growth management policy? *Landsc. Urban Plan.* 2016, 145, 71–82, doi:10.1016/j.landurbplan.2015.09.002
 10. Zhong, R.; Chen, X.H.; Lai, C.G.; Wang, Z.; Lian, Y.; Yu, H.; Wu, X. Drought monitoring utility of satellite-based precipitation products across mainland China. *J. Hydrol.* 2019, 568, 343–359.
 11. METROPOLITAN GREEN BELT AND SUSTAINABLE LANDSCAPE PLANNING FOR A GREENER, 21ST CENTURY. AUTHORS: : AfshinEbrahim, MokhtarMahdaviMeghdadPirsah
 12. BEYOND PORTLAND’S URBAN GROWTH BOUNDARY: TOWARDS AN INTEGRATED LANDSCAPE NETWORK OF URBAN & RURAL LAND USE AUTHORS : Tarique Ahmad, Kafeel Ahmad, Mehtab Ahmad
 13. CHANGING CHARACTERISTICS OF A SIGNIFICANT PART OF URBAN FRINGE IN ANKARA: İMRAHOR VALLEY.. AUTHORS : MokhtarMahdavia A. fshinEbrahimibHosseinAzarpiraa Hamid Reza Tashauoei Amir HosseinMahvid



**Impact Factor:
7.569**



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details