Environment and Ecology 43 (4A) : 1290—1301, October—December 2025
Article DOI: https://doi.org/10.60151/envec/ZQMV9194
ISSN: 0970-0420 (Print), ISSN: 3049-3625 (Online)

Green Belt Development during Industrial Establishment for Environmental Protection and Sustainability– The Indian Perspective

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Received 1 November 2025, Accepted 28 December 2025, Published on 30 December 2025

ABSTRACT

Green Belt is the development of green cover around on empty land inside the project area or within the project influence area. The main objective of Green Belt development is to minimize the pollution load generated from different developmental activities in an Industry. The purpose of a Green Belt around the plant site is to capture the fugitive emissions emanating from Plant operations, attenuate the noise generated and improve the ecosystem. Environmental Protection is considered as an important domain for industrial and other developmental activities in India. Green belt is Irreplaceable natural assets which make the region more climate resilient. The Greenbelt absorbs rainwater, manages storm water during severe weather events, conserves soil erosion, helps to prevent flooding and play an important role in biodiversity conservation, carbon sequestration, and maintaining the air quality. Green belt development is utmost important for environmental protection and conservation along with industrial development. This review paper emphasizes recent updates regarding the Green Belt compliances for an Industry right from defining the Green Belt, designing, development and selection of plant species etc. required for Environment Clearances (EC) for industrial establishment, as per Environment impact assessment (EIA) Notification 2006.

Keywords Green belt, Environment clearance, Industry, Conservation, Public hearing, Climate change, CO_2 sequestration.

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INTRODUCTION

Conservation and protection of the environment is every citizen's duty, as environment being an inseparable part of society, culture and heritage. According to the Indian Constitution, it is the duty of the State and the people to 'safeguard and improve the environment and to protect the forests and wildlife of the country'. In India, an organization of the Ministry of Environment, Forest and Climate Change (MoEF

& CC) and Forest survey of India (FSI) have been monitoring tree resources and Forests in India. In India, National Green Tribunal (NGT) has been established which play a critical role in conservation and protection of Environment (Kasture 2022, Kasture & Pimparkar 2022).

Green belt/Forests act as a sink of atmospheric CO2 and play an important role in mitigation of climate change. As per India State of Forest Report (ISFR) 2021, the total forest cover of India is about 7, 13,789sq. km which is 21.71 % of the total geographic area of the country (ISFR 2021). Moreover, due to rapid urbanization and industrialization, the effective Green Belt or land cover is diminishing progressively resulting in increasing CO_2 emissions excessively, thereby posing threats to our environment and its sustainability. The loss of natural vegetation has raised widespread concern for living beings and its ecosystem. However, restoration of Green Belt in terms of forest conservation by means of afforestation and eco-restoration may play a significant role in mitigating the harmful consequences of global climate change.

The concept of extensive Green Belt development has gained wide attention in India and across global level. In COP 26 climate change submit at Glasgow, India announces for reduction of about one billion tons of the total projected carbon emission by 2030 and assumed to achieve the target of net zero emissions by 2070, to save the Earth from the effects of global warming. To achieve this goal, India is adopting major steps such as adoption of environmentally conscious lifestyle and implementation, strengthening of environmental laws in the form of development of Green Belt during the establishment of infrastructure and/or industrial projects. The Ministry of Environment, Forest and Climate Change, India has developed Environment Impact Assessment (EIA) Notification-2006 under the provisions of the Environment (Protection) Act, 1986 to implement the various environmental issues including the green belt development prior to Environment Clearances to setup the industrial projects (EIA Notification-2006). Earlier, it was recommended to develop at-least 33% green belt of the total industrial area with native plant species (OM Dated 27.10.2020). However, as per the revised norms, it is recommended to develop at-least 25% green belt (for red category project) of the total industrial area with native plant species, however, in case of critically polluted area and severely polluted area development of 40% green belt is recommended (OM Dated 29.10.2025). Further, three tier green belt development with sizable width depending upon plot size and length of periphery and density of Green Belt @ 2500 plants /ha is recommended. The parameters like selection of plant/ species, procedure for plantation, density of trees etc. are adopted as per the existing guidelines of Central Pollution Control Board (CPCB), India. A list of 200 different plant species has been mentioned in the CPCB guidelines for developing greenbelts under particular bio-climatic regimes. According to the CPCB guide lines (Programme Objective Series: PROBES/75/1999-2000), there are 15 Agro climatic zones, each of these regions is further divided in to 68 sub zones based on annual rain fall, Climatic Conditions and soil types.

The plant species selected for the Greenbelt should be quite adapted to a particular Climatic condition. It is found that the pollutants abatement capacity of a plant depends on the effectiveness of different plant, cultivation patterns and screening of specific adaptable plant species (Abhijit *et al.* 2017, Barwise and Kumar 2020, Tomson *et al.* 2021, Anake *et al.* 2022). Moreover, the concept of Green Belt development is crucial and plays an important role in improving the sustainable urban and/or regional ecological environment (Syed and Haider 2023). The present review emphasizes the state-of-the-art information on the Green Belt Program in India, their design and development, impacts on Environmental protection and ecological sustainability for which a detailed spread sheet is evaluated for 52 plants / samplings with CO_2 sequestration.

What the green belt refers to

The Green Belt areas refer to those areas where there are planned open spaces, where no forms of development activities take place like as building of houses, factories, plants etc. These spaces are used only for growing trees and plants. All other spaces adjoining the Green Belt areas must conform to certain regulations and policies for any development activities

(Gupta *et al.* 2008).

Greenbelt means planting of special type of plants suitable to that particular agro climate zone and soil characteristics in a place which will make the area cooler, reduce air pollution, prevent soil erosion and further improve the soil fertility status. A green belt around the periphery of boundary and road side will be created to avoid erosion of soil, prevention of landslides, minimize the air pollution and noise pollution in the project area. The green plants are capable of absorbing air pollutants and forming sinks for pollutants. Leaves with their vast area in a tree crown, absorb pollutants on their surface, effectively reducing their concentration and noise level in the ambient.

Definition and objectives of green belt

It is not easy to define 'Green Belt' with precision. However, interpretations range from "a zone of bio-diversity conservation", to "a patch of trees for the benefit of industry". A general agreement exists, however, that a green belt absorbs pollution around industry and helps in purification of environment (Smith & Dochinger 1976). Thus, a green belt may be defined as "An assemblage of plants, cultivated in an area dominated by human activity, like industries, vehicular traffic, etc. which helps in improvement of environmental conditions through sorption of pollutants. It also screens off activities not conducive to environmental health (Chaphekar 2000). While carrying out the above functions, green belts contribute to aesthetics of the area in a big way and may provide some useful benefits to the local inhabitants. As defined by the Royal Town Planning Institute (RTPI 2002) (Gunn SC 2007), the green belt is indicated as an urban policy aiming at containing sprawl and protecting cities. Also, it is taken as an 'urban shaping device designed to manage urban growth on a regional and sub-regional scale' (Elson M. 1994).

The specific definition of Green Belt with respect to industry has been described by the authors as "An earmarked area where trees and plants of different species are planted, placed and developed in a systematic manner depending upon the prevailing climatic conditions and pollution level of the industry so as to protect the natural environment." It includes:

•An earmarked peripheral land with sufficient width around the plot boundary of the industry and other space within the plot area as designated.

•Overall, an area comprising of 25% in general and 40% in case of CPA/SPA of the total plot be developed as green belt by the industry.

•Series of trees in number of rows (i.e. three tier system) with a sizable width, height and canopy to be developed at the periphery all along, and if required remaining green area to be developed as per the requirement and planning consideration of the Layout plan within the industrial area.

•For Greenbelt, the plant species to be selected as per climatic zones.

•The density of the trees should be around 2500 saplings (Standardization of Environment Clearance conditions for non-Coal mining sector- (OM Dated: 8th January 2019) per Hectare.

(The above definition has been drafted by the authors in accordance with Environment Impact Assessment-2006 and OM Dated 29th Oct 2025 (Rationalizing the requirement of Green Belt/ Green Cover for Industrial Estates /Parks and Individual Industries based on pollution potential)

Green belt design and development

Green Belt design and development has attributed a great importance and became an essential element of planning policy. Greenbelt shall be developed by using appropriate plant species as suggested by CPCB guidelines to mitigate pollution and to improve biodiversity status of the local area.

Green belt design

A number of Factors influence the green belts design such as Climatic factors like wind velocity, temperature, rainfall, sunlight, humidity. Assimilation capacity of the ecosystem; Height and canopy of trees; Size of land available, Distance from sourceSoil and

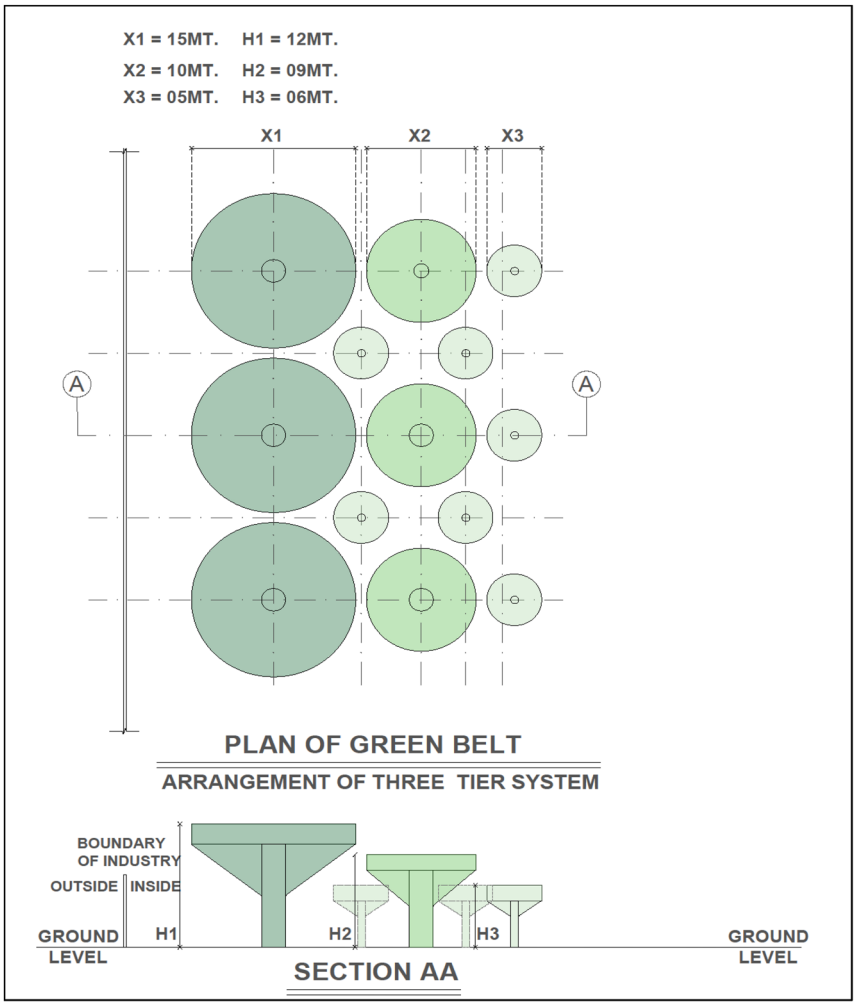

Fig. 1. Arrangement of 3-Tier Green Belt System-Alternative-1.

Water quality; Wind Rose diagram and velocity. For designing a Green Belt two alternatives are suggested as shown in Fig. 1– Fig. 2.

Alternative I: A Three-Tier system (consisting of three rows) is designed along the periphery of the plot / layout (inside the plot boundary) (Fig. 1). In the first row (placed along the boundary) the height of the tree / species is considered to be more than 12 MT (H1) and its expanded canopy/expansion is denoted as X1considered to be more than15 MT. Similarly, for second row the height of species is considered as more than 9 MT (H2) and its expanded canopy is considered as 10 MT (X2). For third row, height of species is considered as 6 MT (H3) and its expanded canopy is considered as 5 MT (X3). After considering the three tiers Plantation as explained above, the width of green belt can be calculated as below—

X1 + X2 + X3 = Total Width

(15 M) + (10 M) + (5M) = 30 M

In this context, a criterion is designed in such a way that, a minimum Green Belt width is considered as 30 M. However, for larger projects with more plot area, a green belt may be increased with more plantations in between the species which shall be helpful

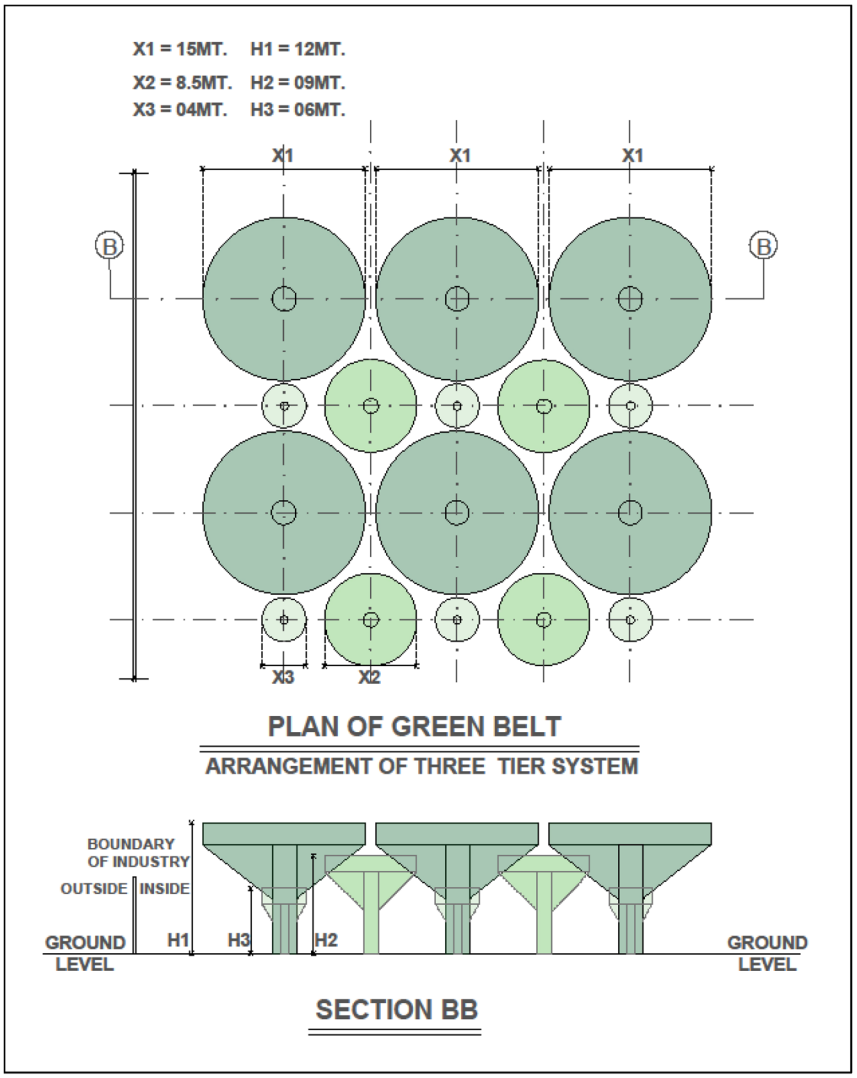

Fig. 2. Arrangement of 3-Tier Green Belt System-Alternative-2.

in case of SPA/CPA projects where minimum green belt area is stipulated as 40% of the total plot area. By doing this a huge width of Green Belt shall be made available to restrict high pollutant level. This arrangement shall also be helpful to mitigate 2500 samplings per Ha of the plot area.

In this scenario, as stated above, since we are considering first row with more height and subsequently lesser height of species for row no. 2 and 3, an angle shall be created with the horizontal plane depending upon the height of species which can be in between 15° to 30°. Thus, this angle of Repose of a Green Belt is very essential to minimize pollutant level inside the plant area. The idea behind having such placement is to enable pollutants to flow with angle of 15° to 30°degrees from the plant area. The remaining Green Belt shall be developed inside plant layout at designated places.

Alternative II: This alternative is designed all together with a different concept that, all the three rows are

placed with same canopy width and same height (Fig 2). Thus, the total width shall be as below—
X1 + X1 + X1 = Total Width
(15M) + (15M) + (15M) = 45 M

Further, the species with lesser heights and canopy widths are placed between the above species. An idea behind such arrangement is that, there is a scope to superimpose tree canopy species having combination of sizes H2-X2 and H3-X3 in order to have a green belt with little high permeability for an industry which produces low emissions. The remaining Green Belt shall be developed as cited in alternative 1 inside the plant layout at designated places. Figure-3 shows the different stages in green belt development.

Calculation of carbon sequestration

Keeping in mind the importance and relevance of various industries in building India's economy, several efforts are underway to enhance the industrial production with reduced carbon emissions. The Expert Appraisal Committee (EAC), in the recent times, during deliberation on the project, inter-alia, includes the certain conditions w.r.t. De-carbonization program such as the Project proponent would have to submit a study report on De-carbonization program, which would essentially comprise of plant carbon emissions, carbon budgeting/ balancing, carbon sequestration activities and carbon capture, use and storage and offsetting strategies. The project proponent is also advised to prepare GHG emissions inventory for the plant and to submit the programme for carbon sequestration by trees. Tree cover/forests are considered as an important sink for carbon sequestration. As per India State of Forest Report 2019 (ISFR 2019), the total carbon stock in forest was estimated as 7,124.6 million tonnes, showing an increase of 502.6 million tonnes from the year 2005 (ICFRE Annual report- 2020; India-BUR3, 2021). The carbon stock for 2021 has been estimated 7,204.0 million tonnes, showing an increase of 79.4 million tonnes of carbon stock as compared to the estimates of previous assessment (ISFR 2021) India has launched several missions including the increasing of green cover that will enhance the carbon sequestration potential (CRIDA 2020).

Carbon sequestration is the process of capturing/ removal and long-term storage of waste CO_2 from the atmosphere, mitigating the impacts of climate change. Green vegetation can play an important role in limiting the atmospheric carbon footprint. The importance of forest areas in carbon sequestration has been well established and documented (Shimamoto *et al.* 2014, Sharma *et al*. 2020, Goñas *et al.* 2022). Moreover, the rate of Carbon sequestration mainly depends on the tree size at maturity, life span and

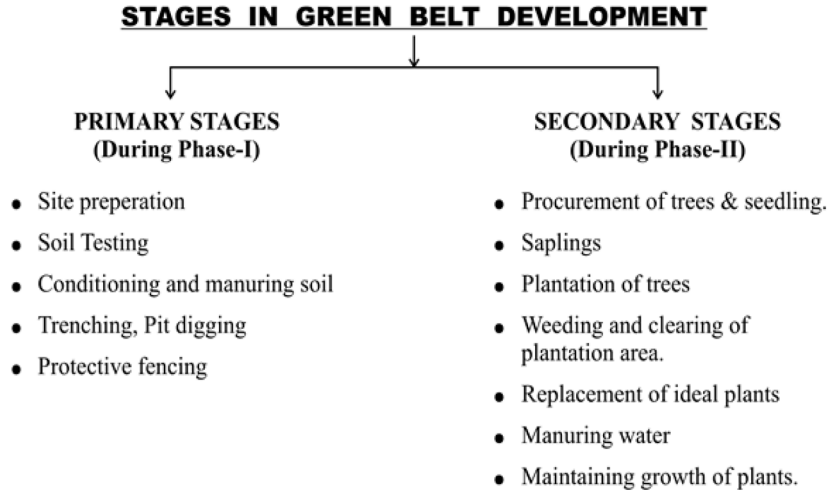

Fig. 3. Stages in Green Belt development.

growth characteristics of the tree species (Nowak and Crane 2002). Following steps may be adopted to calculate the amount of CO_2 sequestration in a tree.

In the given plant species list, carbon sequestration was calculated as per the formula mentioned by University of Mexico (UNM). The rate of carbon sequestration depends on the growth characteristics of the tree species, the density of its wood, the location's conditions for growth, and the stage of the tree.

Step 1: Determine the total green weight of the tree

The green weight is the weight of the tree when it is alive. First, need to calculate the green weight of the tree.

$W_{above\text{-}ground} = 0.25\ D^2\ H$

Where,

$W_{above\text{-}ground}$ = Weight in pounds

D = Diameter of the trunk in inches

H = Height of the tree in feet

The root system weight is about 20% of the above-ground weight. Therefore, to determine the total green weight of the tree, multiply the above-ground weight by 1.2.

Hence, $W_{total\ green\ weight} = 1.2 * W_{above\text{-}ground}$

Step 2: Determine the dry weight of the tree

The average tree is 72.5% dry matter and 27.5% moisture. Therefore, to determine the dry weight of the tree, multiply the total green weight of the tree by 72.5%.

Hence, $W_{dry\ weight} = 0.725 * W_{total\ green\ weight}$

Step 3: Determine the weight of carbon in the tree

The average carbon content is generally 50% of the tree's dry weight total volume. Therefore, in determining the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

$W_{carbon} = 0.5 * W_{dry\ weight}$

Step 4: Determine the weight of carbon dioxide sequestered in the tree

CO_2 has one molecule of Carbon and 2 molecules of Oxygen. The atomic weight of Carbon is 12 (u) and the atomic weight of Oxygen is 16 (u). The weight of CO_2 in trees is determined by the ratio of CO_2 to C is 44/12 = 3.67. Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by 3.67.

Hence, $W_{carbon\text{-}dioxide} = 3.67 * W_{carbon}$

Details of calculations of evaluation of CO_2 for 53 samplings are cited and annexed as supplementary information (Supplementary material. Annexure:1).

Ultimately, the growth of each tree is non-linear, and the greatest sequestration stage is in the younger stages of tree growth, depending on rates and peaks of individual species, with the sequestration of CO_2 per year dropping thereafter. CO_2 sequestration can differ even within tree species, with multiple factors such as growth conditions.

Green belt requirement/ guidelines for environmental clearance

Environmental Guidelines for Industries developed by MoEF&CC, suggest that the industries must care about the surrounding environment and minimize the adverse impacts of industrial operations in the immediate neighborhood as well as distant places. Therefore, these guidelines mandate project owners to maintain the certain distances by the industries from the areas like ecologically sensitive areas, Coastal areas, Flood Plain of the Riverine Systems, Transport/ Communication System and Major settlements. In addition, these guidelines also mandate that economic and social factors have to be recognized and assessed while citing industry.

CONCLUSION

Green vegetation plays a crucial role in eco-resto-

ration by mitigating the negative impacts of climate change, since green vegetation act as a sink of atmospheric CO_2. Development of three tier system of green belt along the periphery of a project with native species is highly recommended. The 3 tier Green Belt system while designing various parameters like sizable width of Green Belt depending upon the industry size i.e. its dimensions, Polyline, Pollution level, Tree Sampling type, Canopy of tree and diameter of tree stem are too important to work on Green Belt aspect in true considerations. This system in toto not only absorbs pollutants but also control noise pollution to significant extent. An entire Green Belt width collectively trap particulate matter i.e. PM10 and PM 2.5 from air. By reducing sound level to its permissible limit, it acts as a barrier between an Industry inside and outside. A Green Belt with above execution method as stated in figures shall protect and control the soil erosion especially during rainy season and where abrupt surface gradient exists. An implementation of Green Belt programme for industry perspective can only be fulfilled when we adopt Green Plantation as cited and discussed above.

Recommendations

While preparing EIA report, during public hearing (PH), the Project Proponent (PP) should elaborate and discuss the scope of Green Belt (GB) with the stakeholders/ local people and further develop the GB with consultation of the local one. Requisite information should also be provided to the local people as to how industry pollutant load could be reduced by adopting right techniques of GB development. Help of NGOs should be taken to create awareness about greenbelt, gathering information of native species and other variables from the local people and involving them in the process of GB development. Workshops/ training programme should be convened to create the awareness among the Project Proponents and another concerned department official regarding the importance of GB development. While preparing EIA report, the Project Proponent should design the Green Belt as per the pollution formation (carbon emission) in the said industry and should arrange / develop the Green Belt considering the three tiers System by using either alternative as mentioned above, which suits to the conditions where industry is located. To have a better and clear understanding about green belt development, a systematic Diagram / drawing with precise /suitable detailing as mentioned in this paper should be executed by the Project Proponent and to be displayed in layout plan of industry in the EIA report. PP should evaluate separately carbon sequestration of three tier GB arrangement as well as GB placed in the layout plan. Inspection should be carried out for GB Area at regular intervals by the experts in the said field or by the sub-committee (central / state wise) formed under EAC. Through this review paper, it is requested to the appropriate authority to come up/ prepare/design a handbook on selection of species for development of GB as per the climatic zones i.e., sort of Ready Reckoner for the Project Proponents in order to select right type of native species, plants and trees, depending upon the nature of industry, layout/area, demographics along with their physical and chemical properties and it may also include basic information in respect of Plant species, Climatic Zone, height, diameter, canopy, growth, life span, carbon sequestration, tolerant, usage and utilities etc. as presented in this paper.

Conflict of interest

The authors declare that there is no conflicts of interest. The author is writing this paper in her individual capacity. The views expressed in this paper are those of the author and does not necessarily reflect the views of the Organisation/Institute.

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List of species for green belt arrangement for outer periphery as well as inside the plot area at designated place.

SN	Name of Species/Family	Type	Average Dia in Inches	Average Height in Feet	W in lb	factor	Total green wt W in lb	Multiplying factor W lb to Kg	W in Kg	Dry wt factor	Dry Weight W in Kg W dry wt	Carbon Factor	Carban Weight W carbon	CO2 factor	CO2 Weight in Kg WCO2	Growth rate	Ecological & env performance of plant species
					0.25 DsqH	**1.2**		**2.2**		**0.73**		**0.5**		**3.67**			
1	*Achras sapota* (Sapotaceae)	Tree	10	35	875	1.20	1050.00	2.20	2310.00	0.73	1686.30	0.50	843.15	3.67	3094.36	Slow growing	T
2	*Aegle marmelos* (Rutaceae)	Tree	12	35	1260	1.20	1512.00	2.20	3326.40	0.73	2428.27	0.50	1214.14	3.67	4455.88	Slow growing	T
3	*Ailanthus excels* (Simaroubaceae)	Tree	8	25	400	1.20	480.00	2.20	1056.00	0.73	770.88	0.50	385.44	3.67	1414.56	Quick growing	T,DC, CN

Continued...

4	*Albizia lebbeck* (Mimosaceae)	Tree	12	30	1080	1.20	1296.00	2.20	2851.20	0.73	2081.38	0.50	1040.69	3.67	3819.32	Quick growing	T, DT
5	*Anogeissus latifolia* (Combretaceae)	Tree	12	40	1440	1.20	1728.00	2.20	3801.60	0.73	2775.17	0.50	1387.58	3.67	5092.43	Slow growing	T
6	*Annona squamosa* (Annonaceae)	Tree	11	30	908	1.20	1089.00	2.20	2395.80	0.73	1748.93	0.50	874.47	3.67	3209.29	Quick growing	DR
7	*Anthocephalus chinensis* (Rubiaceae)	Tree	14	38	1862	1.20	2234.40	2.20	4915.68	0.73	3588.45	0.50	1794.22	3.67	6584.80	Quick growing	T
8	*Azadirachta indica* (Meliaceae)	Tree	8	20	320	1.20	384.00	2.20	844.80	0.73	616.70	0.50	308.35	3.67	1131.65	Quick growth after first season	DC, OGE,NC, AG,DR, SR,FR
9	*Bauhinia purpurea* (Caesalpiniaceae)	Tree	13	40	1690	1.20	2028.00	2.20	4461.60	0.73	3256.97	0.50	1628.48	3.67	5976.54	Quick growing	T
10	*Bauhinia racemosa* (Caesalpiniaceae)	Tree	12	42	1512	1.20	1814.40	2.20	3991.68	0.73	2913.93	0.50	1456.96	3.67	5347.05	Quick growing	T
11	*Butea monosperma* (Fabaceae)	Tree	16	45	2880	1.20	3456.00	2.20	7603.20	0.73	5550.34	0.50	2775.17	3.67	10184.87	Slow growing	NC,OGE,DC
12	*Callistemon citrinus* (Myrtaceae)	Shrub	7	22	270	1.20	323.40	2.20	711.48	0.73	519.38	0.50	259.69	3.67	953.06	Slow growing	T, DR
13	*Carissa spinarum* (Apocynaceae)	Shrub	9	32	648	1.20	777.60	2.20	1710.72	0.73	1248.83	0.50	624.41	3.67	2291.59	Quick growing	T
14	*Cassia fistula* (Caesalpiniaceae)	Tree	6	20	180	1.20	216.00	2.20	475.20	0.73	346.90	0.50	173.45	3.67	636.55	Quick growing	T
15	*Cassia siamea* (Caesalpiniaceae)	Tree	9	32	648	1.20	777.60	2.20	1710.72	0.73	1248.83	0.50	624.41	3.67	2291.59	Fast growing	T
16	*Dalbergia sisoo* (Fabaceae)	Tree	10	35	875	1.20	1050.00	2.20	2310.00	0.73	1686.30	0.50	843.15	3.67	3094.36	Quick growth after first season	T
17	*Delonix regia* (Fabaceae)	Tree	16	35	2240	1.20	2688.00	2.20	5913.60	0.73	4316.93	0.50	2158.46	3.67	7921.56	Quick growing	DC
18	*Dypsis Lutescens* (Arecaceae)	Tree	8	25	400	1.20	480.00	2.20	1056.00	0.73	770.88	0.50	385.44	3.67	1414.56	Slow growing	T,SR,OGE
19	*Eucalpytus citridora* (Myrtaceae)	Tree	15	42	2363	1.20	2835.00	2.20	6237.00	0.73	4553.01	0.50	2276.51	3.67	8354.77	Quick growing	T
20	*Emblica officinalis* (Euphorbiaceae)	Tree	18	55	4455	1.20	5346.00	2.20	11761.20	0.73	8585.68	0.50	4292.84	3.67	15754.72	Quick growing	T,DC,NC
21	*Ficus benghalensis* (Moraceae)	Tree	24	58	8352	1.20	10022.40	2.20	22049.28	0.73	16095.97	0.50	8047.99	3.67	29536.11	Quick growing	T,DC
22	*Ficus Benjamina* (Moraceae)	Tree	14	36	1764	1.20	2116.80	2.20	4656.96	0.73	3399.58	0.50	1699.79	3.67	6238.23	Quick growing	T,DC,NC

Continued...

23	*Ficus religiosa* (Moraceae)	Tree	18	55	4455	1.20	5346.00	2.20	11761.20	0.73	8585.68	0.50	4292.84	3.67	15754.72	Slow growing in early stages	T,NC,OGE, DC
24	*Ficus glomerata* (Moraceae)	Tree	18	45	3645	1.20	4374.00	2.20	9622.80	0.73	7024.64	0.50	3512.32	3.67	12890.22	Quick growing	T,DC
25	*Ficus virens* (Moraceae)	Tree	9	30	608	1.20	729.00	2.20	1603.80	0.73	1170.77	0.50	585.39	3.67	2148.37	Quick growth after first season	T
26	*Lagerstroemia parviflora* (Lythraceae)	Tree	9	25	506	1.20	607.50	2.20	1336.50	0.73	975.65	0.50	487.82	3.67	1790.31	Quick growing	T
27	*Madhuca longifolia* (Sapotaceae)	Tree	18	45	3645	1.20	4374.00	2.20	9622.80	0.73	7024.64	0.50	3512.32	3.67	12890.22	Quick growing	T
28	*Mangifera indica* (Anacardiaceae)	Tree	24	50	7200	1.20	8640.00	2.20	19008.00	0.73	13875.84	0.50	6937.92	3.67	25462.17	Quick growing	S, DC
29	*Moringa oleifera* (Moringaceae)	Tree	10	38	950	1.20	1140.00	2.20	2508.00	0.73	1830.84	0.50	915.42	3.67	3359.59	Quick growing	DR
30	*Morus alba* (Moraceae)	Tree	9	28	567	1.20	680.40	2.20	1496.88	0.73	1092.72	0.50	546.36	3.67	2005.15	Quick growing	T
31	*Polyalthia longifolia* (Annonaceae)	Tree	8	42	672	1.20	806.40	2.20	1774.08	0.73	1295.08	0.50	647.54	3.67	2376.47	Quick growing	T,DC,OGE, CN,AG
32	*Pongamia pinnata* (Fabaceae)	Tree	9	40	810	1.20	972.00	2.20	2138.40	0.73	1561.03	0.50	780.52	3.67	2864.49		NC,DR,S-R,FR
33	*Psidium guajava* (Myrtaceae)	Tree	10	35	875	1.20	1050.00	2.20	2310.00	0.73	1686.30	0.50	843.15	3.67	3094.36	Quick growing	T
34	*Saraca Ashoka* (Coesolpinoceoe)	Tree	8	30	480	1.20	576.00	2.20	1267.20	0.73	925.06	0.50	462.53	3.67	1697.48	Quick growing	T,DC,NC
35	*Spondias pinnata* (Anacardiaceae)	Tree	16	45	2880	1.20	3456.00	2.20	7603.20	0.73	5550.34	0.50	2775.17	3.67	10184.87	Quick growing	T
36	*Syzygium cumini* (Myrtaceae)	Tree	18	48	3888	1.20	4665.60	2.20	10264.32	0.73	7492.95	0.50	3746.48	3.67	13749.57	Quick growing	T
37	*Tamarindus indica* (Caesalpiniaceae)	Tree	20	50	5000	1.20	6000.00	2.20	13200.00	0.73	9636.00	0.50	4818.00	3.67	17682.06	Quick growing	T
38	*Tectona grandis* (Lamiaceae)	Tree	15	62	3488	1.20	4185.00	2.20	9207.00	0.73	6721.11	0.50	3360.56	3.67	12333.24	Quick growing	DC
39	*Terminalia arjuna* (Combretaceae)	Tree	15	35	1969	1.20	2362.50	2.20	5197.50	0.73	3794.18	0.50	1897.09	3.67	6962.31	Quick growing	T
40	*Terminalia chebula* (Combretaceae)	Tree	18	45	3645	1.20	4374.00	2.20	9622.80	0.73	7024.64	0.50	3512.32	3.67	12890.22	Quick growing	T
41	*Duranta repens* (Verbenaceae)	Shrub	5	10	63	1.20	75.00	2.20	165.00	0.73	120.45	0.50	60.23	3.67	221.03	Quick growing	T
42	*Bouhaminvilla spectalillis* (Nyctaginaceae)	Shrub	8	15	240	1.20	288.00	2.20	633.60	0.73	462.53	0.50	231.26	3.67	848.74	Quick growing	T
43	*Caesalpinia Pulcherrima* (Fabaceae)	Shrub	7	14	172	1.20	205.80	2.20	452.76	0.73	330.51	0.50	165.26	3.67	606.49		T, DC

Continued...

44	*Callistemon viminalis* (Myrtaceae)	Shrub	8	15	240	1.20	288.00	2.20	633.60	0.73	462.53	0.50	231.26	3.67	848.74		T,DC
45	*Citrus limon* (Rutaceae)	Shrub	10	20	500	1.20	600.00	2.20	1320.00	0.73	963.60	0.50	481.80	3.67	1768.21	Quick growing	T
46	*Grewia Subinaequalis* (Tiliaceae)	Shrub	12	25	900	1.20	1080.00	2.20	2376.00	0.73	1734.48	0.50	867.24	3.67	3182.77	Quick growing	T
47	*Hibiscus rosa-sinensis* (Malvaceae)	Shrub	8	23	368	1.20	441.60	2.20	971.52	0.73	709.21	0.50	354.60	3.67	1301.40	Quick growing	T
48	*Lawsonia inermis* (Lythraceae)	Shrub	6	12	108	1.20	129.60	2.20	285.12	0.73	208.14	0.50	104.07	3.67	381.93	Quick growing	T
49	*Murraya paniculata* (Rutaceae)	Shrub	5	10	63	1.20	75.00	2.20	165.00	0.73	120.45	0.50	60.23	3.67	221.03	Quick growing	T
50	*Nerium indicum (*Apocynaceae)	Shrub	7	15	184	1.20	220.50	2.20	485.10	0.73	354.12	0.50	177.06	3.67	649.82	Quick growing	T,DC
51	*Rhapis excels* (Arecaceae)	Shrub	8	35	560	1.20	672.00	2.20	1478.40	0.73	1079.23	0.50	539.62	3.67	1980.39		T,SR,OGE
52	*Sesbania sesban (*Fabaceae)	Shrub	8	24	384	1.20	460.80	2.20	1013.76	0.73	740.04	0.50	370.02	3.67	1357.98	Quick growing	T
53	*Thevetia peruviana* (Apocynaceae)	Shrub	8	28	448	1.20	537.60	2.20	1182.72	0.73	863.39	0.50	431.69	3.67	1584.31	Quick growing	T

Ecological performance:
S - Sensitive
CN –Control Noise level,
OGE – Absorb Gas emission (Sexena 1991)i and (Abbasi & Khan 2000)ii
DC - Dust Controller (CPCB 2007)iii
Environmental Adaptation (DR - Drought resistance, SR - Salinity resistance, FR - Fire Resistance, T- Tolerant to Air Pollution)

i) Saxena, V.S. 1991. Afforestation as a tool for environmental improvement. In: Executive development program on greening the townships. Vaniki Prashikshan Sansthan, Jaipur. Pp 13-44.

ii) Greenbelts for Pollution Control: Concepts, Design, Applications. 2000. Abbasi, S.A. and F.I. Khan. Discovery Publishing House, New Delhi.

iii) Phytoremediation of particulate matter from ambient environment through dust capturing plant species. Published 2007 by Central Pollution Control Board, Ministry of Environment & Forests, Govt. of India in Delhi .

References : 1) *Guidelines for developing greenbelts, CPCB, March 2000, PROBES/75/1999-2000.*
2) *Trees proposed for green belt m/s Matangi industries LLP Unit -1at GIDC -Vatva.*
3) *EIA Report for exsiting formulation and API MFG Plant at MIDC Patalganga , Maharashtra.*
4) *https://www.unm.edu/~jbrink/365/Documents/Calculating_tree_carbon.pdf (University of New Mexico).*
#treeplanting #carbon #sequestration #climateaction #carbondioxide.