

Indoor Plantation: the benefit and contribution to UNSDG & Employee wellbeing

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Abstract

This abstract explores how indoor plantation aligns with the Envirocious Receptive Workplace Certificate (ERWC) standard, focusing on its role in fostering a sustainable and employee-centric work environment. Indoor plantation offers various benefits such as improved air quality, stress reduction, and aesthetic enhancement, all of which are essential criteria for ERWC certification. By incorporating indoor plants into the workplace, organizations demonstrate their commitment to environmental stewardship and employee well-being, key pillars of the ERWC standard. This abstract highlight the synergies between indoor plantation initiatives and the international standards like ERWC standard, LEED, UNSDG & ISO 45001 emphasizing their collective contribution to creating healthier, more sustainable, and environmentally responsible workplaces.

Introduction:

Indoor plantation in office spaces has gained popularity due to its numerous benefits, including improved air quality, enhanced well-being, and aesthetic appeal. This report evaluates the implementation of indoor plantation in an office with 200 employees, focusing on the benefits, challenges, and cost-benefit analysis.

Plants can significantly improve indoor air quality and contribute to reducing heating/cooling loads, thereby benefiting employees in various ways:

1. **Air Purification:** Plants absorb pollutants such as carbon dioxide, volatile organic compounds (VOCs), and airborne toxins, effectively purifying indoor air. This can lead to a healthier indoor environment, reducing the risk of respiratory issues and enhancing overall well-being for employees.
2. **Humidity Regulation:** Plants release moisture through a process called transpiration, which can help regulate indoor humidity levels. Maintaining optimal humidity levels can improve comfort and reduce the need for additional humidification or dehumidification, thus lowering heating and cooling loads.
3. **Temperature Regulation:** Plants can provide natural shading and cooling effects through transpiration and evaporation. Strategically placed plants near windows or in sunny areas can help reduce solar heat gain, thereby lowering the need for air conditioning and decreasing cooling loads.
4. **Noise Reduction:** Some plants can absorb sound and dampen noise levels, creating a quieter and more comfortable indoor environment for employees. Reduced noise pollution can improve concentration, productivity, and overall satisfaction among employees.
5. **Psychological Benefits:** Indoor plants have been shown to reduce stress, anxiety, and fatigue while enhancing mood and creativity. A pleasant **and** green workspace can boost morale, increase job satisfaction, and promote a positive work culture.
6. **Aesthetic Enhancement:** Incorporating plants into indoor spaces improves aesthetics and creates a more inviting and welcoming atmosphere. Employees are likely to feel more connected to nature and experience greater satisfaction with their work environment.
7. **Biophilic Design:** Incorporating elements of nature, such as indoor plants, into the workplace aligns with the principles of biophilic design, which emphasizes the connection between humans and nature. Biophilic workplaces are associated with higher levels of employee satisfaction, engagement, and productivity. International standards such as the WELL Building Standard and LEED (Leadership in Energy and Environmental Design) certification and ENVIROCIOUS RECEPTIVE WORKPLACE CERTIFICATION, encourage the adoption of biophilic design principles to create healthier and more productive indoor environments.

Improving indoor air quality with plants involves selecting suitable species known for their air-purifying properties and strategically placing them within indoor environments. Here's how to do it, along with considerations for carbon reduction potential and impact on air quality:

1. **Selecting Suitable Plants:** Choose indoor plants known for their air-purifying abilities, such as:
 - Spider Plant (*Chlorophytum comosum*)
 - Snake Plant (*Sansevieria trifasciata*)
 - Peace Lily (*Spathiphyllum* spp.)
 - Boston Fern (*Nephrolepis exaltata*)
 - Areca Palm (*Dyopsis lutescens*)
2. **Placement:** Position plants strategically throughout indoor spaces, focusing on areas with poor ventilation or high pollutant levels. Place larger plants near windows to maximize natural light and air circulation.
3. **Carbon Reduction Potential:** Plants absorb carbon dioxide (CO₂) during photosynthesis and release oxygen (O₂) into the air. While their direct impact on reducing indoor CO₂ levels may be modest compared to ventilation systems, plants contribute to overall air quality improvement and carbon sequestration, especially when integrated into larger sustainable practices.
4. **Impact on Air Quality:** Plants help remove indoor air pollutants, including volatile organic compounds (VOCs) such as formaldehyde, benzene, and xylene. They absorb these pollutants through their leaves and roots, where microorganisms in the soil break them down. Additionally, plants increase humidity levels through transpiration, which can reduce airborne particles and improve overall air quality.
5. **Suitability and Maintenance:** Consider factors such as available space, lighting conditions, and maintenance requirements when selecting plants. Choose species that thrive indoors and are suitable for the specific environment. Regular watering, proper drainage, and occasional pruning are essential for plant health and optimal air-purifying effectiveness.
6. **Monitoring and Adaptation:** Monitor indoor air quality regularly and adjust plant placement or species selection as needed. Some plants may be more effective than others in removing specific pollutants, so experimentation and adaptation may be necessary to achieve the desired results.
7. **Compliance with Occupational Health and Safety Standards:** International standards and regulations, such as ISO 45001 for occupational health and safety management systems, emphasize the importance of providing safe and healthy work environments for employees. Indoor plantation can help organizations meet these standards by improving indoor air quality, reducing stress, and enhancing overall workplace conditions.

Indoor plantation can have several impacts on greenhouse gas (GHG) emissions and cooling loads in indoor environments:

1. **GHG Emissions:**
 - **Carbon Sequestration:** Indoor plants absorb carbon dioxide (CO₂) during photosynthesis, acting as carbon sinks and helping to reduce CO₂ levels in the air. While indoor plants may sequester relatively small amounts of carbon compared to outdoor vegetation, their cumulative impact can contribute to mitigating GHG emissions indoors.
 - **Reduced Energy Consumption:** By improving indoor air quality and reducing the need for mechanical ventilation, indoor plants can indirectly help lower energy consumption associated with heating, cooling, and air conditioning systems. This can result in reduced emissions from fossil fuel-based energy sources used for indoor climate control.
2. **Cooling Load:**
 - **Transpiration and Evapotranspiration:** Indoor plants release moisture through transpiration, a process similar to sweating in humans. This evaporation of water from plant leaves can have a cooling effect on indoor air, reducing the need for mechanical cooling systems and lowering cooling loads.
 - **Shading:** Larger indoor plants can provide shading and block direct sunlight from entering indoor spaces, reducing solar heat gain and alleviating the cooling load on air conditioning systems. Strategic placement of plants near windows or in sunny areas can further enhance their shading effects.
 - **Humidity Regulation:** Indoor plants increase humidity levels through transpiration, which can help maintain optimal indoor humidity levels for human comfort. Proper humidity control can

reduce the perception of temperature and decrease the need for excessive cooling, thereby lowering cooling loads.

Overall, while the direct impact of indoor plantation on GHG emissions and cooling loads may be modest compared to other energy-saving measures, such as energy-efficient HVAC systems or building insulation, indoor plants can still contribute to reducing emissions and improving indoor comfort through their air-purifying, cooling, and humidity-regulating properties. When integrated with other sustainable practices, such as energy-efficient building design and operation, indoor plantation can play a valuable role in creating healthier, more sustainable indoor environments.

Implementation Plan:

Implementing an indoor plantation in an office space involves careful planning, coordination, and execution to create a conducive environment for plant growth while minimizing any disruptions to daily operations. Here is a detailed implementation plan:

I. Needs Assessment and Goal Setting:

- Identify the objectives of the indoor plantation project, such as improving air quality, enhancing aesthetics, promoting employee well-being, or demonstrating environmental responsibility.
- Conduct a needs assessment to determine the types of plants suitable for the office environment, considering factors such as available space, lighting conditions, temperature, and maintenance requirements.
- Set specific goals and targets for the indoor plantation project, such as the number and variety of plants to be installed, air quality improvement metrics, or employee satisfaction surveys.

II. Site Selection and Preparation:

- Assess the office space to identify suitable areas for installing indoor plants, such as near windows for natural light exposure or in common areas with adequate ventilation.
- Clear and prepare designated areas for plant installation, ensuring sufficient access to water sources and drainage facilities.
- Consider installing planters, shelves, or hanging baskets to maximize vertical space utilization and minimize floor footprint.

III. Plant Selection and Procurement:

- Research and select plant species that are well-suited for indoor environments, require minimal maintenance, and offer specific benefits such as air purification or stress reduction.
- Source plants from reputable nurseries or suppliers, ensuring they are healthy, pest-free, and acclimatized to indoor conditions.
- Consider incorporating a variety of plant types, including foliage plants, flowering plants, succulents, and air-purifying plants, to create visual interest and diversity in the indoor plantation.

IV. Installation and Setup:

- Arrange for the delivery of plants and necessary supplies, such as potting soil, planters, watering cans, and fertilizers.
- Install plants in designated areas according to their specific light and humidity requirements, ensuring adequate spacing between plants to facilitate air circulation and prevent overcrowding.
- Label plants with their names and care instructions to facilitate maintenance and educate office occupants about the benefits of indoor plants.

V. Maintenance and Care:

- Develop a maintenance schedule outlining tasks such as watering, pruning, fertilizing, and pest control, taking into account the needs of different plant species and seasonal variations.
- Assign responsibility for plant care to designated staff members or appoint a dedicated indoor gardening team responsible for monitoring plant health and addressing any issues promptly.
- Provide training and resources to employees on proper plant care techniques, including watering guidelines, light requirements, and signs of common plant ailments.

VI. Monitoring and Evaluation:

- Establish protocols for monitoring plant health, growth, and overall performance over time, using metrics such as leaf color, foliage density, and flowering frequency.
- Regularly assess the impact of indoor plants on air quality, employee satisfaction, productivity, and absenteeism through surveys, feedback mechanisms, and environmental monitoring tools.
- Use monitoring data to make informed decisions about plant selection, placement, and maintenance practices, optimizing the indoor plantation for maximum benefits.

VII. Engagement and Awareness:

- Promote awareness and appreciation of the indoor plantation among office occupants through signage, newsletters, workshops, and interactive events.
- Encourage employee participation in plant care activities, such as watering schedules, pruning sessions, or educational workshops on indoor gardening techniques.
- Solicit feedback from employees on their experiences with the indoor plantation, including any suggestions for improvement or additional plant varieties they would like to see.

VIII. Adaptation and Expansion:

- Continuously evaluate the performance of the indoor plantation and be prepared to adapt strategies or make changes as needed to address emerging issues or capitalize on new opportunities.
- Explore opportunities for expanding the indoor plantation over time, such as adding new plant species, incorporating vertical green walls, or integrating hydroponic or aquaponic systems for growing edible plants.

By following this comprehensive implementation plan, organizations can successfully establish and maintain an indoor plantation in their office space, creating a healthier, more vibrant work environment for employees while demonstrating a commitment to sustainability and well-being.

Cost-Benefit Analysis:

- **Costs:**

- **Plant Purchase:** Estimate the cost of purchasing indoor plants based on the selected species and quantity required for the office space.
- **Maintenance:** Consider ongoing costs for watering, fertilizing, pruning, and replacing plants as needed.
- **Infrastructure:** Evaluate the need for additional infrastructure such as planters, potting soil, and watering systems.
- **Labor:** Assess the labor costs associated with plant maintenance, including employee time or outsourcing to professional services.

- **Benefits:**

- **Improved Productivity:** Quantify the potential increase in productivity resulting from enhanced employee well-being and reduced stress levels.
- **Health Benefits:** Estimate the cost savings associated with reduced absenteeism and improved health outcomes due to better indoor air quality.
- **Aesthetic Value:** Consider the intangible benefits of a more visually appealing and welcoming office environment.
- **Brand Image:** Assess the potential positive impact on brand image and employee satisfaction, which may lead to improved recruitment and retention.

Alignment with UNSDG:

Indoor plantation, also known as indoor gardening or indoor landscaping, aligns with several Sustainable Development Goals (SDGs) established by the United Nations. Here's how:

- I. **SDG 3: Good Health and Well-Being:** Indoor plants contribute to creating healthier indoor environments by improving air quality, reducing stress, and promoting well-being. Cleaner air and a more pleasant environment can lead to better health outcomes for occupants.
- II. **SDG 11: Sustainable Cities and Communities:** Indoor plantation enhances the quality of urban living spaces by greening indoor environments and promoting biodiversity. It contributes to creating more sustainable and livable cities by improving air quality, reducing the urban heat island effect, and enhancing aesthetic appeal.
- III. **SDG 13: Climate Action:** Indoor plants help mitigate climate change by sequestering carbon dioxide (CO₂) from the atmosphere through photosynthesis. While the impact may be modest compared to outdoor vegetation, indoor plantation contributes to carbon reduction efforts and promotes climate resilience.
- IV. **SDG 15: Life on Land:** Indoor plantation supports biodiversity conservation by providing habitats for beneficial insects and microorganisms. It also raises awareness about the importance of plants and ecosystems in sustaining life on land, fostering a deeper connection to nature among urban populations.
- V. **SDG 12: Responsible Consumption and Production:** Indoor plantation encourages responsible consumption by promoting the use of sustainable and biodegradable materials in plant pots and containers. It also promotes sustainable lifestyles by encouraging gardening and plant care practices that minimize resource consumption and waste generation.
- VI. **SDG 8: Decent Work and Economic Growth:** Indoor plantation can create economic opportunities through the sale of indoor plants, gardening supplies, and related services. It supports job creation in sectors such as horticulture, landscaping, and urban agriculture, contributing to economic growth and livelihood improvement.
- VII. **SDG 9: Industry, Innovation, and Infrastructure:** Indoor plantation fosters innovation in sustainable building design and indoor environment management. It encourages the integration of green building practices, such as biophilic design and living walls, into urban infrastructure, promoting resource efficiency and resilience.

Indoor plantation aligns with multiple SDGs by promoting health and well-being, fostering sustainable urbanization, mitigating climate change, conserving biodiversity, encouraging responsible consumption, supporting economic growth, and fostering innovation in sustainable development. By incorporating indoor plants into indoor environments, individuals and organizations can contribute to achieving the broader goals of sustainability and human development.

Indoor plantation in the office offers a range of benefits, including improved air quality, enhanced well-being, and aesthetic appeal. While there are upfront costs associated with plant purchase and maintenance, the long-term benefits in terms of productivity, health, and brand image outweigh the initial investment. Implementing indoor plantation in the office of 200 employees is a worthwhile investment in creating a healthier, happier, and more productive workplace environment.

Recommendation: The recommended ratio of plants to employees in an office environment can vary depending on factors such as the size of the space, the types of plants selected, and the desired aesthetic and health benefits. However, a commonly cited guideline is to aim for approximately 1 plant per 100 to 150 square feet of indoor space.

To calculate the square footage per employee, you would need to divide the total indoor space by the number of employees.

For example, if you have an office space of 10,000 square feet and 200 employees:

Total indoor space: 10,000 square feet

Number of employees: 200

Divide the total indoor space by the number of employees to find the square footage per employee:

10,000 square feet / 200 employees = 50 square feet per employee

Then, using the guideline of 1 plant per 100 to 150 square feet, you can determine how many plants are recommended for the entire office space:

If using the lower end of the guideline (1 plant per 150 square feet), you would need approximately 67 plants for the entire office space (10,000 square feet / 150 square feet per plant).

If using the higher end of the guideline (1 plant per 100 square feet), you would need approximately 100 plants for the entire office space (10,000 square feet / 100 square feet per plant).

Conclusion: In conclusion, indoor plantation offers a multifaceted approach to enhancing workplace environments, aligning with international standards and certifications such as the Envirocious Receptive Workplace Certificate (ERWC). By incorporating indoor plants into the workplace, organizations not only improve air quality, reduce stress, and enhance aesthetics but also demonstrate their commitment to sustainability and employee well-being. Indoor plantation initiatives complement existing workplace standards by addressing key criteria related to environmental responsibility, health, and productivity. As organizations strive to create healthier, more sustainable, and environmentally conscious workplaces, indoor plantation emerges as a valuable and effective strategy for achieving these goals while fostering a positive and conducive work environment for employees.

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