Figure 1. The cultivation of Marigolds under the metro tracks of Delhi. Photo: Mayank Austen Soofi

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POLICY BRIEF

The Role of Urban Agriculture in India's Green Building Policy

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Key Messages

- Despite growing awareness regarding the positive environmental impact of urban agriculture (UA), India is yet to recognise these as part of cities' green infrastructure.

- While the sustainability contribution and multiple health benefits of green vegetation in urban environments is recognised, neither the national building regulations nor the green building ratings pay due attention to UA, specifically food-based UA practices.

- India has the third highest green building growth rate in the world[1], not incorporating and mandating UA into existing green building policies, is a missed opportunity.

Executive Summary

Urban agriculture, including terrace gardens, vertical gardens, and front or backyard gardens have multiple benefits for energy, water, and waste management discernible at the scale of the building and its immediate vicinity.[2] The health benefits of food-based UA are also well established.[3] Yet, current building codes and green building standards do not fully leverage UA-based interventions to make India's construction sector "green".

Purpose

This policy brief examines the National Building Code (NBC), 2016[4], and Green Certification Standards commonly used in India such as the Indian Green Building Council[5] (IGBC) and the Leader in Energy & Environmental Design[6] (LEED) green building rating systems in order to:

a. Understand the status of UA-based greening strategies in these building standards

b. Identify areas where UA-based interventions can be incorporated more substantially

c. Present recommendations to promote UA through existing building norms

Figure 2. Rooftop garden in Pune, India. Photo: Siddhartha Sikdar/Flickr

Figure 3. Raised bed cultivation. Photo: Siddhartha Sikdar/Flickr

Key Policy-Relevant Results

1. *NBC, 2016:* While first published in 1970, it was not until the Code's second revision in 2005 that due attention was made to sustainable development concerns and the incorporation of discussions on rain water harvesting, renewable resource use, etc. The 2016 NBC added a new chapter, titled 'Approach to Sustainability.' Some of the key highlights include:

- Discussions on integrated water management, solid waste management, use of local and renewable resources, with special attention to energy conservation and efficiency.
- Vertical landscaping, roof gardens, and green roofs are mentioned as design elements that can conserve energy and improve buildings' thermal performance.
- Contribution of vegetation/trees and proper landscaping for storm water management, soil maintenance, maintenance of biodiversity, noise reduction, etc. is also mentioned.
- A section on "urban agricultural practices/social forestry" acknowledges their contribution to greening, heat reduction, storage of excess storm water, etc. However, no specific emphasis is laid on food producing, vegetable and fruiting plants.

Accordingly, the NBC generally highlights the importance of greenery. It recommends roof gardens, vertical gardens, and soft landscape for smaller developments, while encouraging larger developments exceeding 10 hectares, to maintain a minimum of 5 percent bio-capacity to sustain themselves. However, these recommendations are suggestive and not mandatory.

2. *The Green Rating Standards*: A Comparison of IGBC and LEED green rating systems[7] reveal that, there is ample opportunity to strengthen the position of food-based UA, specifically within the indigenous green certification program (i.e. IGBC) (see **Table 1** below).

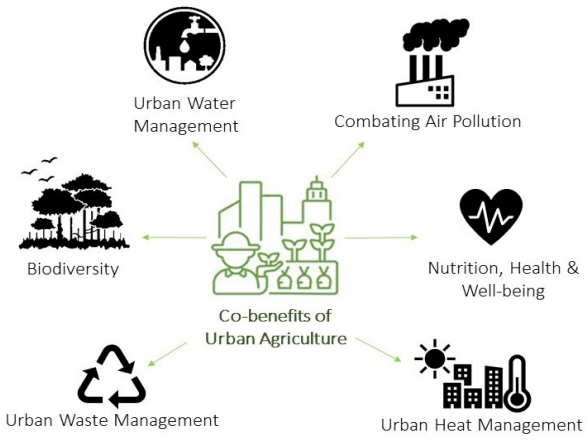

Figure 4. Co-benefits of Urban Agriculture. Source: Parama Roy (author)

Table 1. Mention of trees/vegetation/agriculture/food production in the green rating systems

Focus area	Indian Green Building Council	Leader in Energy & Environmental Design
Land and Habitat	***Sustainable Design Credit 1: Natural Topography & Vegetation*** To minimize disturbances to the natural topography, up to 4 points are assigned, if 40% of the site area is maintained to promote **local habitat and biodiversity on ground and on built structures** (implying vertical gardens, green roofs, etc).	***Location & Transport Credit: Sensitive Land Protection*** To protect environmentally sensitive land, 1 to 2 points are assigned, so development is avoided on (peri-urban) **farmland** and habitats for threatened species, floodplains, wetlands, etc. ***Location & Transport Credit: Surrounding Density and Diverse Uses*** To conserve land and protect farmland and wildlife habitat, 1 to 6 points are assigned so new developments happen in areas of certain density, while avoiding **farmlands.** ***Sustainable Sites (SS) Credit: Protect or Restore Habitat*** To conserve existing natural areas and restore damaged areas, 1 to 2 points are assigned; **vegetated roof surfaces** may be included in the habitat area calculations, if the plants are native and/or adapted to provide natural habitat.
Water	***Water Conservation Mandatory Requirement 2: Rain Water Harvesting (RWH) and 6: Enhanced RWH*** To enhance the ground water table and reduce municipal water demand, up to 4 points are assigned so appropriate RWH systems are designed to capture run-off from roof and non-roof areas (**green roofs** with low run-off coefficient is mentioned) ***Water Conservation Credit 1: Landscape Design*** To ensure minimum water consumption, 3 points are assigned, if landscape design includes **fruit/ vegetable bearing plants** for at least 5% of the total landscaped area. ***Water Conservation Credit 4: Recycle & Reuse of Waste Water*** To reduce consumption of potable water and waste water generation, 2 points are assigned, if treated waste water is reused for **landscaping**.	***Sustainable Sites Credit: Rainwater Management*** To reduce runoff volume and improve water quality, 1-3 points are assigned if **Green Infrastructure (GI)** practices are appropriately used to retain excess run-off on site.
Heat	***Sustainable Design Credit 2: Heat Island Effect*** To reduce heat island effect on the microclimate and local biodiversity, 2 points are assigned, if percentage of the area covered with **trees** / low Solar Reflective Index (SRI) materials / **grass pavers** to the total non-roof area is 75%, or if at least 75% of exposed roof area is provided with a combination of High SRI materials/ High albedo materials / **roof gardens /vegetation**.	***Sustainable Sites Credit: Heat Island Reduction*** To minimize the effects of heat on microclimates, including on humans and wildlife habitats, 1 to 2 points are assigned, if larger part of Non-roof and roof areas are maintained with **trees** and **vegetation** to provide shade or **vegetated roofs** or high reflectance roof surface compared to the total site area.
Health	***Resident Health & Wellbeing Credits:*** This category is dedicated to health, but fails to recognise how UA can contribute to the nutrition and physical/mental health of individuals	***Sustainable Sites Credit: Open Space*** To encourage interaction with the environment, social interaction, passive recreation, and physical activities, 1 point is assigned to provide outdoor open spaces, that may include **garden spaces** dedicated to **community gardens** or **urban food production** and **vegetated roofs.**
Energy	***Energy Efficiency Credits:*** Does not explicitly mention the role of greening but focuses on energy efficient appliances and the use of renewable energy, specifically solar.	***Energy & Atmosphere Credits:*** Does not explicitly mention the role of greening, but focuses on efficient metering, energy performance and renewable energy use.
Waste	***Material & Resources Credits:*** This section encourages reuse of treated organic waste in the form of manure/compost within the site, implying/supporting more green spaces within the built environment.	***Materials & Resources Credits:*** This section focuses largely on use of recycled & environmentally benign material for construction and does not mention composting.

Ample scope for UA integration in building norms

A thorough reading of these building norms and green standards presents the following observations:

1. Mention of UA/horticulture/food-based plants is extremely limited in standards that guide building construction in India. While green spaces/trees/vegetation are generally recognised for their contribution to preserving natural ecosystems, reducing heat, and water management, **explicit mention of agriculture and food producing plants/trees remain missing**, especially in the indigenous rating system. Even in the NBC, social forestry/urban farming appears as an afterthought.

2. The green ratings **define 'green' primarily in terms of energy efficiency** with greater emphasis on renewable energy/solar rooftop systems compared to terrace gardens that can also improve thermal comfort and reduce cooling needs.

3. Despite evidence from research showing the wellbeing outcomes related to urban agriculture and food growing activities, **the Health and Wellbeing cluster within the IGBC rating system fail to mention any form of UA**.

Conclusion: Key Recommendations

Given that Green Building Certifications are on the rise in India, this presents a great opportunity for the promotion of UA, if explicitly identified as green infrastructure, and if a minimum rating is made mandatory for all new buildings. Therefore, we recommend that:

- Regulations for the built environment should mainstream agriculture-based interventions, by **mandating building bylaws to support UA**, and offering tax and/or FSI incentives, specifically for food-based terrace or on-the-ground gardens.
- **Green Ratings need to become mandatory** to ensure greater impact.
- **UA needs to be explicitly mentioned and given due credit points**, especially for its contribution to health and wellbeing outcomes.
- UA-based interventions need to be assigned greater credit points for their **multiple co-benefits** (see Figure 4 above), which are all key components within the green rating systems.

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[6] Leader in Energy & Environmental Design (LEED) Rating System -v4.1, 2021 (prepared by the US Green Building Council). [Online] Available at: https://www.usgbc.org/leed/v41

[7] The national IGBC rating system and the international LEED certification program are the two most commonly used green building ratings in India. Others include: Green Rating for Integrated Habitat Assessment - GRIHA (at least 3-star ratings under GRIHA is mandated for all central government and PSU buildings) and Excellence in Design for Greater Efficiency - EDGE (yet to gain traction in the country's green building market).